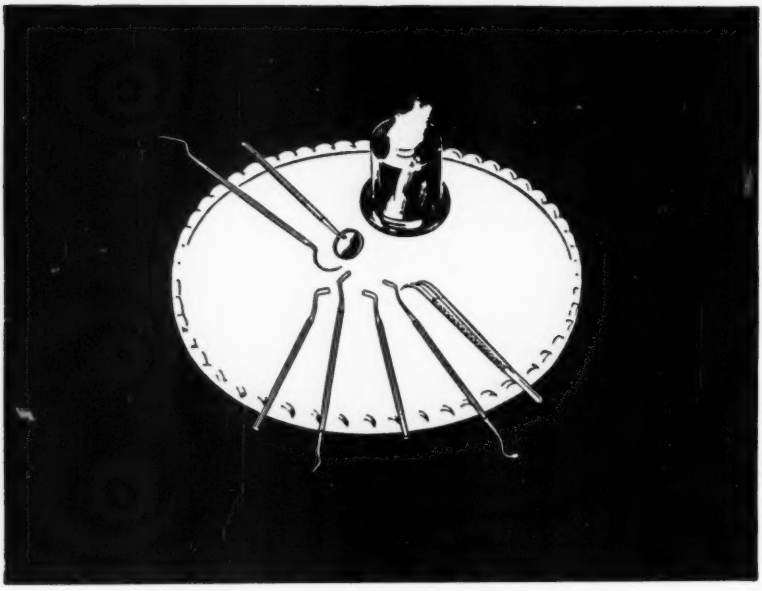
The DENTAL JOURNAL OF Australia

VOLUME - - - 22
NUMBER - - - 1
JANUARY - - 1951

REGISTERED AT THE G.P.O., SYDNEY, FOR TRANSMISSION BY POST AS A NEWSPAPER.



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CONTENTS

COMMUNICATIONS: **Page**

Pattern of caries in relation to the pattern of soil fertility. W. A. Albrecht 1

Traumatized anterior teeth. R. G. Ellis 8

Aspects of dental health activities in Norway. Guttorm Toverud 17

Treatment of child patients in general practice. W. D. Suthers 33

EDITORIAL DEPARTMENT:

Fluoridation of public water supplies 42

NEWS AND NOTES: 44

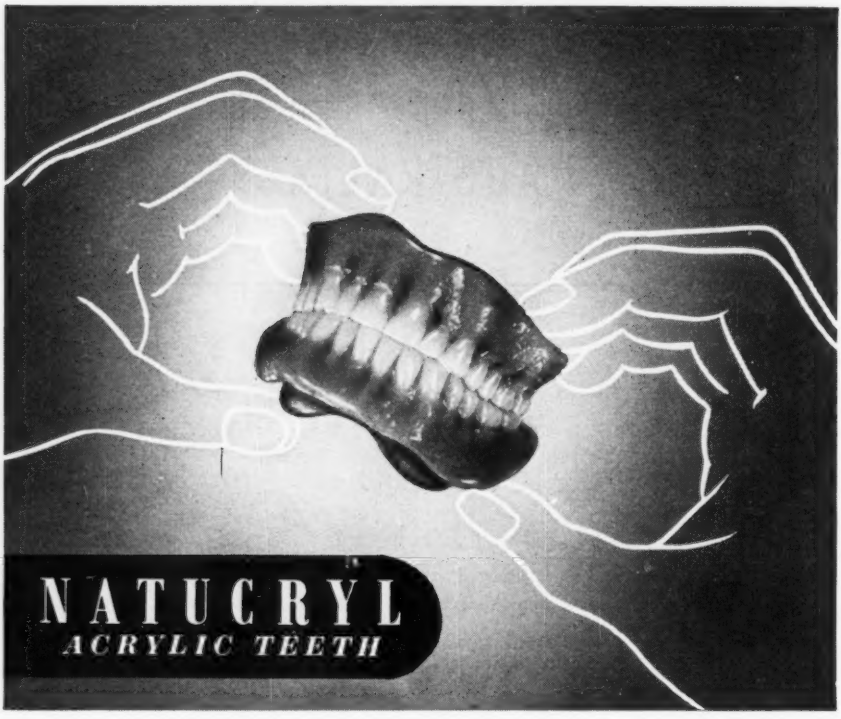
ASSOCIATION ACTIVITIES: 45

Honorary Editor: H. R. SULLIVAN, M.D.S.

Published by the Australian Dental Association (N.S.W. Branch)
B.M.A. HOUSE, 135-137 MACQUARIE STREET, SYDNEY.

Communications intended for publication in "The Dental Journal of Australia" should be addressed to the Editor. All advertising and business matters should be directed to the Secretary.

Subscription: £1/5/- per annum; Overseas, £1/10/-; Single Copy, 2/6.



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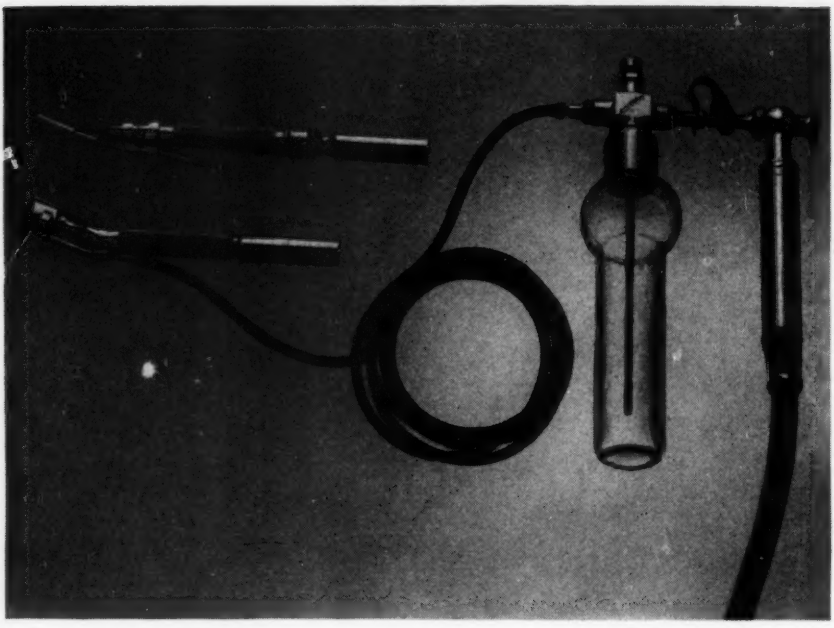

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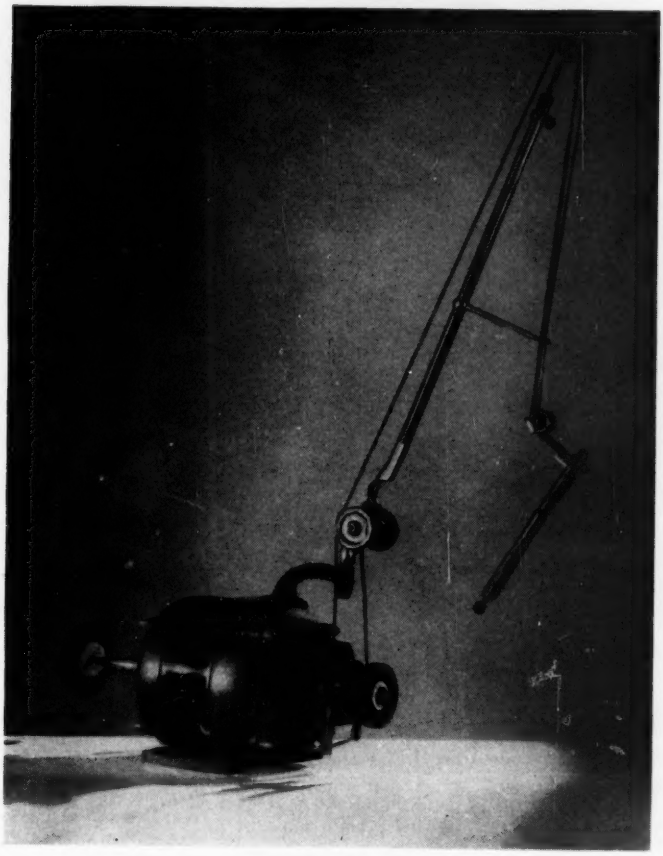

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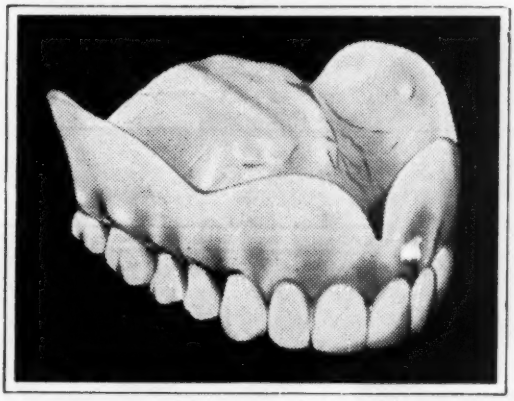

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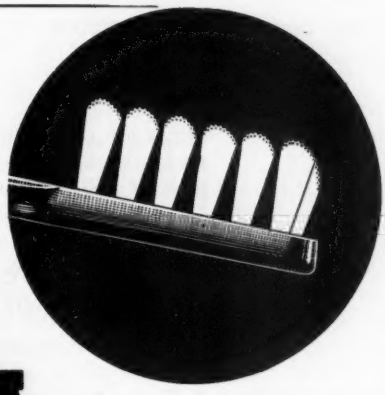

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PATTERN OF CARIES IN RELATION TO THE PATTERN OF SOIL FERTILITY IN THE UNITED STATES*†

WM. A. ALBRECHT.**

While close correlations of phenomena are not necessarily proof of causal connection between them, they serve to stimulate search for such. The similarity between the relative numbers of caries per individual arranged by states for some sixty-nine thousand inductees into the U.S. Navy (1942) and the pattern of the soil fertility according to its climatic development is just such a stimulation. A combination map of these is presented (Fig. 1) for the suggestive value of it in our study of the soil fertility, i.e., the list of essential chemical elements coming from the soil in our foods, as this guarantees delivery of (a) the inorganic essentials in the ash—both major and trace elements—and, (b) the many required food compounds coming from the synthetic activities of plants and microbes.

THE GEOGRAPHY OF THE SOILS RATHER THAN AVAILABLE DENTAL SERVICES DETERMINES THE PATTERN OF CARIES.

During 1942 the Navy[1] took careful records of the dental condition of each of 69,584 inductees in relation to the economic conditions and the availability of dental services in the home territory. These data by geographical regions, as commonly used, were recalculated and rearranged to agree more closely with the climatic pattern of soil fertility (Fig. 1). This gave areas dividing the country into longitudinal belts, each approximately two states wide. The Mississippi River served well as one division line, since the belt of two states wide adjoining it on the west is also bisected by the still more helpful line separating the calcareous soils of the country (pedocals) on the west from the lime-deficient or acid soils (pedalfers) on the east.

The data show that the minimum caries per mouth is in this soil belt of dominantly wind-moved materials, moderate rainfall, and of outstanding

*Contribution from the Department of Soils, Missouri Experimental Station, Columbia, Missouri, Journal Series.

†Presented at the Twelfth Australian Dental Congress, Sydney, August, 1950.

**Professor of Soils, University of Missouri.

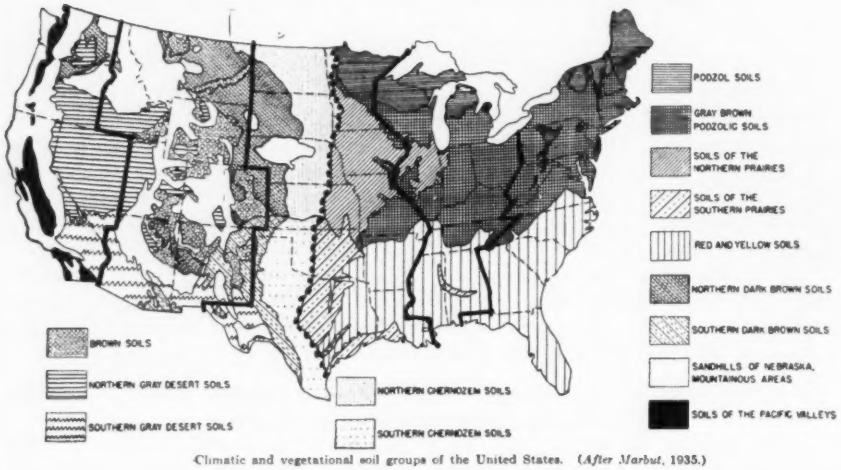
1. C. A. Schlack and J. E. Birren.—Influences on dental defects in navy personnel: Science, 104:259-262, 1946.

agricultural production by the chernozem and prairie soils. There is increasing caries on going either westward from this belt to decreasing annual rainfall, or eastward to increasing precipitation and more dentists (Fig. 2). The fact that the soils developed in the temperate zone by moderate rainfall support the better dental conditions warrants the hypothesis that the dental picture reflects the nutritional history of which the soil fertility is the significant foundation.

When the country is viewed for its pattern of the development of the soil, this also points out its belts of longitudinal arrangement, particularly in the western half. By starting with the very low rainfall of the west (omitting the Cascade Range on the extreme west) and going eastward (Fig. 2), these are

The relative number of caries per individual distribute themselves with the minimum figure in the mid-continental belt, bisected by the line separating the calcareous soils on the west from the lime-deficient soils on the east.

9.10	8.80	8.38	10.06	11.45	Cavities per person.
6.40	4.30	3.70	4.89	6.10	Fillings per person.
15.50	13.10	12.08	14.95	17.55	Total caries per person.



Climatic and vegetational soil groups of the United States. (*After Marbut*, 1935.)

Fig. 1.

belts of increasing rainfall. They represent increasing rock breakdown, more clay content of the soil, better soils with more fertility in available form absorbed on that clay, and more seasonal rainfall, all for growth of the crops of higher protein production and higher nutritional services to man and his herds. The most productive of these are in the midcontinental belt with the Mississippi River marking the western edge.

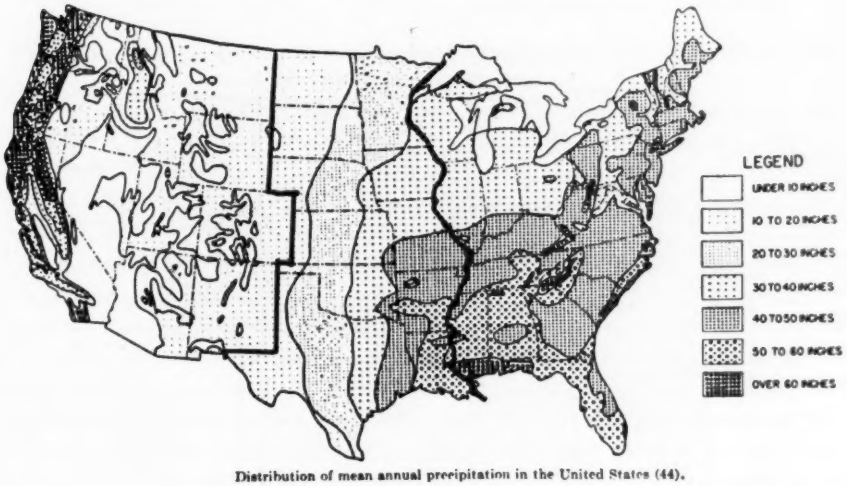
On going eastward from the central belt, however, the increasing annual rainfall represents soil destruction rather than soil construction with reference to protein output in the crops. Higher rainfall has broken more rock down—and that more completely—to give soils of higher clay contents. Much rain has removed the lime from the soil. Many other elements of fertility, along with the calcium, have gone out to the sea. The processes of soil development, encouraged by decay of more organic matter grown there, have substituted hydrogen, or acidity, on the higher clay content of the soil. Such soils

encourage a woody, protein-deficient and ash-deficient vegetation as represented by the forest primeval. Higher temperatures on going south accompanying still higher rainfall made still more, but a mineralogically different, clay. On this clay very little acidity and much less cations of nutritional values would be held. This is the climatic reason for the poor supplies of fertility under the virgin coniferous forests of the south, and thereby for the "poor" soils and "poor" people depending on the agriculture of that area today.

Only a Particular Combination of Climatic Forces Develops Soils Giving Complete Nutrition for Animals and Man.

The differences in productivity of the soils according to their differences in climatic development suggest their responsibility for the differences demon-

Moderate rainfall in a longitudinal belt of the Mid-continent outlines the region of the lowest number of caries per mouth. Less rainfall and too little soil development to the West, and much higher rainfall and excessive soil development to the East, suggest the soil in control of the caries.



Distribution of mean annual precipitation in the United States (44).

Fig. 2.

strated by the teeth as reflectors of complete or incomplete nutrition. The Midcontinental belt of lowest caries per mouth (twenty-four years of average age) originally contained the great herds of American bison. Within that territory this strictly herbivorous feeder migrated north in the summer and south in the winter. His wanderings eastward and westward seemed to have been limited, except for the fact that small numbers were native to the bluegrass region of Kentucky, made famous by the fine racehorses today. Also a few were native to some of the limestone valleys of Pennsylvania, widely known for the excellent farming by the thrifty agrarian Germans. This single case of wild animal array, a superimposition on the pattern of soil fertility, suggests that the latter must play a significant role rather than be just an accidental correlation. The physiology that builds proteins in the vegetation to undergird building of bone and brawn while favouring reproduction in

numbers mounting to great herds suggests its support by the fertility of the soil. The virgin vegetation in this belt was not trees. Instead, it was prairie grasses, capable of surviving the summer droughts by temporary dormancy in the plants' growth processes. This was the bison's only feed. He purchased no protein supplements.

The limited rainfall did not weather those soils destructively. They are not leached into a highly acid condition. They are not deficient in the elements essential for good nutrition of plants (including the legumes) for high protein production, and good reproduction by means of heavy yields of seed. The buffalo and his big muscular body reflected the nutritional qualities of the herbage coming from the responsible fertility in the soil. This was of wide

Human and bovine reactors to Histoplasmin tests as percentages of the samples according to the areas in Kansas producing different concentrations of protein in the wheat.

Percentages of Histoplasmin Reactors. | Among 3,600 students, lifetime residents of respective areas. (Solid Lines.) Among cows in the three sections of the State. (Broken and Solid Lines.)

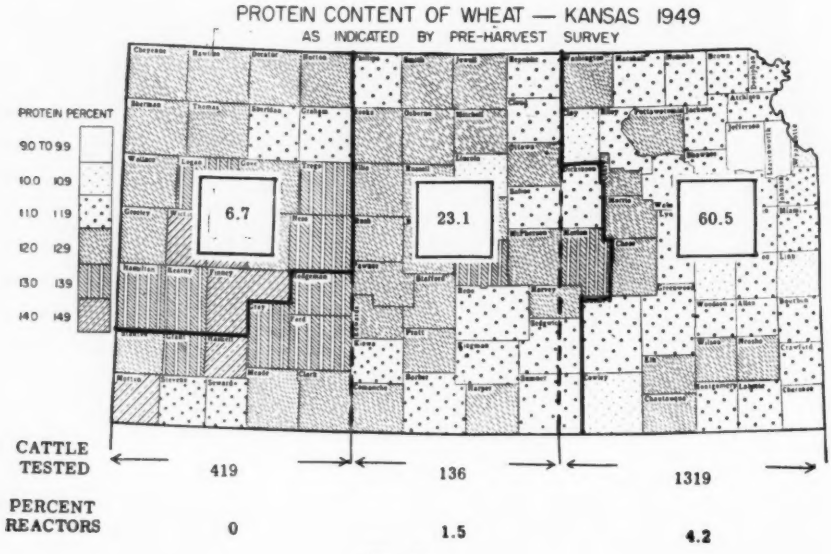


Fig. 3.

diversity in elements because of windblown origins from extensive, less-weathered areas to the windward west. Here were soil fertility conditions pointing to carbohydrate production bringing with it also high protein output for growth and reproduction rather than to carbohydrate output only for mainly fattening effects.

The same soil area gave us more recently the slim, trim, but muscular body of the cowboy, championship basketball teams, and many of the selections of All-American football players. In livestock, it is the area of beef and literally the major Hereford belt. It grows the high-protein wheats. It provides

the major output of that grain mounting one year to nearly three hundred million bushels in Kansas alone. That grain demonstrates increasing concentrations of its protein as one crosses this belt from the higher rainfall of nearly 40 inches along the eastern to less than 20 inches at the western side (Figs. 2 and 3). It is the area where the quality of the vegetative output is high in terms of protein as more nearly complete array of the essential amino-acids and of all the inorganic elements commonly associated with their production. In these facts there is the suggestion that the soil fertility pattern, not in terms of higher yields as bushels and tons per acre, but of quality output that guarantees growth and reproduction, deserves more consideration in looking at the health conditions of the teeth. By means of this broader pattern we would probably arrive at the suspicion, at least, that much that is now called "disease" should more properly be called deficiencies in nutrition because of low soil fertility.

Statistical Patterns of Other Diseases Superimposed on the Soil Fertility Pattern May be Suggestive.

Perhaps if the statistical aspects of more diseases were mapped for the country as a whole and superimposed on the map of soils to be interpreted in their nutritional aspects, there might be suggestions regarding the deficiencies provoking the different ailments. Such results have not yet been demonstrated widely. However, recently a pronounced correlation between the decreasing percentage of reactors, both human and bovine, to the test for the infection by the fungus *Histoplasmin capsulatus* and the decreasing rainfall as it develops the soil less, or leaves more lime in the soil, was brought to attention by Sam E. Roberts, M.D., of Kansas City (Fig. 3). With the state divided into three sections, namely, East, Middle, and West, and with a rainfall reduction from 40 to 20 inches or less, in making that transition, the percentages of the tested student population reacting positively went down from 60.5 to 23.1 and then to 6.7. This represents a decided decline of infection by this fungus in going from the low-lime soils under higher degree of soil development westward to the high-lime soils under lower degrees of weathering and development. It is also a case of going from the area of low protein in the wheat to the area of high percentage of it in this food grain.

The agreement of this series of figures, in general principle, with the percentages for the cattle population in the same parts suggests that these animals with feeding habits more local to the soil, confirm the report by the student population. Here is a distinct correlation of disease pattern with the soil fertility pattern. Here is a significant one which awaits the establishment of possible causal connections. This is all the more challenging when with the higher lime content in the soil, and also with higher concentration of protein in the wheat grain in going across the state, there is also less infection in

students and cattle by *Histoplasmin capsulatus* for which the human body manifests symptoms suggesting tuberculosis.

Equally as interesting for the State of Kansas is the statistical pattern of the rate of death by cancer. Here, again, the correlation between this and the other patterns already outlined as dependent on the soil fertility is so startling that it, too, adds its weight in suggesting that these degenerative behaviours of the human body may go back to deficiencies in nutrition and from there back to the soil fertility.

Protein Deficiencies Originating in Soil Deficiencies May be Undermining the Body's Biochemical Defences.

The suggestion that the soil and its deficiencies in the inorganic essentials for plants, animals, and man should set the disease pattern may seem far-fetched. This concept will certainly be neither verified nor disproved as long as only the presence of microbes is taken as the direct cause of health troubles—particularly in the mouth and teeth—rather than the consideration of them as probably only another symptom of the body's weakened biochemical defence because of malnutrition. However, with more diseases being classified as degenerative, and with vitamins defined as "something that will kill you if you don't eat it," there is a growing admission that some folks are being killed gradually because of some things they don't eat. Diseases, then, may not need positive agencies. Their symptoms are bringing us to think of causation prefixed by a minus sign.

Shortages of protein, because of deficiencies in soil fertility to cause them, may come in for more consideration as "disease" provocation when we recall that, in measuring this conglomeration of essential amino-acids, we measure no more accurately than by a method of ashing in sulphuric acid and multiplying the collected nitrogen by a mathematical factor established by common consent. Protein deficiencies, then, (a) in total because of economic conditions, and (b) in completeness of the required amino-acids, because of no greater refinement of our knowledge to lessen our ignorance of them in foods and of their possible relation to soil fertility, may well be a major factor in health degeneration.

That such thinking about the soil and proteins in relation to health deserves extension is suggested by our "cure" of tuberculosis. This is not brought about by the extermination of the microbes from the body through the use of pesticides, antiseptics, or antibiotics. Instead the "cure" is brought about by complete rest of the patient and his better nutrition under a generous, but high-protein, diet. Under such nutrition the microbes seemingly recognize their too hasty, or premature, entrance in anticipation of a task of disposal of a cadaver and move out. If our reasoning is sound about the high-protein diet

driving them out, is it fallacious reasoning to believe that insufficient, or low-protein, diet and the malnutrition resulting invited them into the body? We may well raise the question "Were the microbes the cause or a symptom following the predisposing period of deficiencies of protein, *et altera*, in the nutrition?"

RESEARCH ON HEALTH CORRELATIONS WITH SOIL FERTILITY OUGHT TO BE MORE CHALLENGING.

Since animals and man do not synthesize proteins from the elements but only assemble them from the amino-acids, and since the plants and the microbes alone can affect their syntheses and then only by the help of the more complete list of essentials in the fertility of the soil (both as major and trace elements), it seems reasonable that much could be learned about deficient health by correlating it with the soil fertility and corresponding nutrition. With more such correlations confronting us there ought to be encouragement for research under the belief that we may discover more causal connections. By such discoveries we may effect prevention of more bad health and the reciprocal of it, namely, the establishment of more good health in the body in general, and in the teeth—an exposed portion of its skeletal part—in particular. Through more diligent research we may eventually see the causal connections, as well as the correlations, between our soils and our teeth and, we hope, between our soils and ourselves.

TRAUMATIZED ANTERIOR TEETH*

ROY G. ELLIS, D.D.S., M.Sc. (DENT.), F.D.S., R.C.S. (ENG.).

The child with a traumatized anterior tooth presents the dentist with an emergency problem of frustrating dimensions. I have said frequently that I would rather my own child break an arm than an anterior tooth. The arm, in most instances, will yield to treatment, without subsequent deformity. No amount of knowledge or skill can induce reunion of enamel or dentine of the injured tooth. It remains the privilege and responsibility of the dentist to help the child with the broken tooth.

Of first importance when reviewing this subject is the role of the anterior tooth to the beauty of the face. A distorted or broken front tooth can be a disfiguring anomaly leading to sensitiveness and in some children to the development of a mental complex, the implications of which cannot be measured in terms of teeth alone.

While the effect of shock on the pulp of a traumatized tooth is unpredictable, it must be recognized as a complicating factor. The numerous thin-walled vessels of the pulp rupture easily. The confinement of the pulp within unyielding dentine walls endangers its life during a period of inflammation. The prognosis for the young tooth with a large apical foramen is more favourable. Similarly the tooth with a root fracture usually survives inflammation and congestion. The end result of traumatic injury to the pulp may be: firstly, return of the pulp to normal physiological state; secondly, it may undergo chronic degeneration with ultimate calcific obliteration of the pulp space; thirdly, necrosis may result. Our clinical observations indicate that if early necrosis results, it will likely occur within ten weeks from the time of injury. This period has been termed the "critical recovery period" and it influences treatment-planning.

The original problem of emergency associated with traumatic injury has now taken on new facets, namely, a possible indirect effect on the child's mental well-being and uncertainty as to the life of the pulp. What proportions does this complex problem assume for the general practitioner? In 1944 a survey was undertaken to determine the incidence of fractured teeth among Toronto school-children. It was found that 178 or 4.2% of a group of 4,251 children in 7 city schools had fractured teeth. The incidence is comparatively small, and yet I am sure your experience would lead you to report that the number is significantly large. Perhaps you will agree with those who claim these accidents to be on the increase. It is appropriate that we recall the opinion expressed by one author who said that protruding front teeth are among the "hallmarks of modern civilization." Protruding front teeth with little or no lip coverage are vulnerable to accidental trauma.

Diagnosis and treatment-planning should be systematic and positive. Delay and procrastination may result in irreparable damage to irreplaceable vital tissues. A large percentage of those cases, if given immediate, well-directed emergency treatment, will respond favourably.

*Presented at the Twelfth Australian Dental Congress, Sydney, August, 1950.

Three requirements must be fulfilled before proceeding with treatment: firstly, a brief history of the case and the patient's complaint; secondly, a careful clinical examination; thirdly, a roentgenological examination for immediate use and also for comparison with subsequent roentgenograms. The importance of the latter point cannot be overemphasized.

In an attempt to simplify treatment-planning, a classification of injuries to teeth has been suggested as outlined below.

Class I: Simple fracture of the crown—involving little or no dentine.
Class II: Extensive fracture of the crown — involving considerable dentine, but not the dental pulp.
Class III: Extensive fracture of the crown — involving considerable dentine and exposing the pulp.
Class IV: The traumatized tooth which becomes non-vital — with or without loss of crown structure.
Class V: Tooth lost as result of trauma.
Class VI: Fracture of the root—with or without loss of crown structure.
Class VII: Displacement of a tooth—without fracture of crown or root.
Class VIII: Fracture of the crown and its replacement.
Class IX: Traumatic injuries to deciduous teeth.

Great caution should be exercised when discussing with the parent the prognosis of an injured tooth. Despite evidence of only a minor injury, the most unexpected complications develop.

Remember that the pulp of an injured tooth may be suffering shock, and treatment, particularly during the critical recovery period, must avoid further irritation. An injured tooth should be protected from external traumata for some time after the accident and requires an indefinite period for its recovery.

Treatment may be resolved briefly into three phases: (1) Emergency, (2) Intermediate, (3) Final.

Emergency treatment should be designed to protect the injured tooth from further irritation during the 8-10 week critical recovery period. Place the injured tooth at rest, if possible.

Intermediate treatment embraces restorative procedures. Intermediate restorations must be stable, with some degree of permanence, aesthetically satisfactory, and involving a minimum amount of preparation. This temporary restoration may be in place for several years depending on the age of the child at the time of the accident.

The *final* phase of treatment may be considered when the tooth is more mature. It usually involves more extensive preparation of the tooth. In most cases of fracture the time which elapses from the emergency treatment stage to the final restoration may be a matter of 1-9 years. During that period the tooth in question should be under continual observation with roentgenograms and vitality tests.

In the brief time at my disposal I should like to discuss three of the commonest problems encountered in the treatment of injured teeth. These are:—

1. Protection and treatment of the pulp.
2. Root therapy for the non-vital tooth.
3. Restoration of the fractured tooth.

Protection of the Pulp.

The behaviour of the pulp to irritation is well summarized by Kronfeld[1]: "The pulp is an extremely sensitive organ which reacts very readily to any irritation or injury. A severe injury may even cause immediate death of the pulp while a lesser injury causes a typical inflammation known as pulpitis." Because the pulp is enclosed in an unyielding calcified chamber, there can be no compensation for an increased supply of blood which accompanies inflammation. In the young tooth with an incompletely developed root apex and in the case of the tooth with a root fracture, there is some provision for collateral circulation which compensates for the increased blood supply. From clinical experience, however, we are impressed with the extraordinary recuperative power of the pulp tissue in the young healthy tooth, following accidental injury.

Consideration of pulp protection begins with the simple case of the tooth which is injured but which shows no outward signs of injury. Numerous cases have been seen in which two maxillary centrals have been involved, one suffering a fractured crown and the other remaining intact. Quite commonly the tooth with the fractured crown remains vital while the intact tooth suffers pulp damage which leads to necrosis. We know of no therapeutic measures which can be applied to restore the inflamed pulp in the non-fractured tooth. We would suggest, however, that placement of the injured tooth at rest is desirable if possible.

In the Class II cases where the crown of a tooth is fractured with considerable exposure of the dentine, but not an actual exposure of the pulp, operative procedures for pulp protection may be required. The objective of emergency treatment in these cases is to prevent further irritation to the already inflamed pulp. This treatment includes avoidance of the use of strong irritating drugs on the exposed dentine and placement of the tooth at rest. The steps in protection of the pulp in the Class II case are as follows:—

Clean all debris off the fractured crown of the tooth, using routine methods but observing great care not to injure the tooth further. Select a celluloid or resin crown-form and contour it to fit accurately the entire crown of the fractured tooth. Examine the form for possible tissue impingement and also then for clearance in all functional biting positions. Remember, the tooth must not suffer further traumatic injury through function. Lay the form aside and dry the isolated tooth. Cover the exposed dentine with a suitable mix of a rapid-setting, capping paste. Care should be exercised to avoid pressure on the dentine during this and subsequent procedures. After the capping paste has set so that it will not be readily displaced, seal the fractured end of the tooth with a layer of cement. There are two alternatives in placing the protecting form on the tooth. If a celluloid form has been used, prepare a creamy mix of cement; partly fill the form and seat to place over the tooth. This form will remain in place for a period of eight to ten weeks only if it fits accurately and covers the entire crown of the tooth.

With the introduction of the self-curing resins an alternative for the seating of the crown-form presents. In this procedure a resin-form should

1. Kronfeld, R.—Histopathology of the teeth and their surrounding structures, Philadelphia, 1933, Lea & Febiger, p. 106.

be used. A satisfactory shade of the resin filling material is selected and a suitable mix is made and the form partly filled with the mixed resin. The form is placed over the tooth and the resin allowed to polymerize for a period of four minutes. At the end of four minutes, the crown-form with its lining of resin is removed from the tooth and the process of polymerization goes on to completion. This resin cap is then cemented in place on the tooth with oxy-phosphate cement. In both cases, just prior to cementation of the celluloid form or the modified resin-form to the fractured tooth, it should be perforated with a No. 3 Round Bur on the lingual side about two millimetres from each of the incisal angles in order to allow for the ready escape of excess cement. The retention and the aesthetics of the second type of restoration are better, but occasionally one is confronted with a greater degree of bulk. The patient should be advised before dismissal to report at once if pain should be experienced in the near future. Otherwise a rest period of eight to ten weeks is allowed, following which the patient is recalled and the injured tooth re-examined carefully.

Protection of the Exposed Pulp.

The pulp exposure may be a minute pin-point involvement of one or both horns of the pulp, or the entire bulbous coronal portion of the pulp may be exposed. According to the type of exposure, the length of time the pulp has been exposed, the age of the patient, and the general status of the pulp, there are four possible procedures in treatment. These are:—

1. Pulp capping.
2. Pulpotomy (partial removal of the pulp).
3. Pulpectomy (total removal of the pulp).
4. Extraction of the tooth.

The degree of success in treatment will depend, firstly, on the accuracy of the diagnosis made as to the status of the pulp and, secondly, upon the adherence to satisfactory methods in implementing treatment.

Pulp Cutting.

For a minute exposure of short duration in which there is little evidence of haemorrhage and where the root apex of the tooth is almost completely closed, pulp capping may be undertaken with reasonable hopes for success. The technique varies very slightly from that already described for the Class II case. Again we stress that no strong irritating drugs should be used on the pulp and pressure from the capping material must be avoided at all costs. A capping paste of calcium hydroxide and distilled water has been used by many clinicians with considerable success. Other capping materials have been described in the literature from time to time. Where there are complications such as root fracture or displacement of the tooth, pulp capping is contraindicated. In these cases the procedure of choice recommended is either pulpectomy or extraction of the tooth.

A slight variation from the procedure described for the Class II case should be introduced at the stage of cementation of the crown-form placed over the tooth. In order to facilitate removal of the crown-form at the end of the eight to ten week period without encountering re-exposure of the pulp, the surface of the cement casing covering the capping material should be lubricated just prior to cementation of the crown.

Pulpotomy.

While partial removal of the pulp is an exacting procedure and requires strict adherence to principles of asepsis, nevertheless it has been usefully employed in certain cases. Among the factors indicating the use of the pulpotomy technique are: the case of extensive exposure of the pulp; where the pulp may have been exposed for several days; where the root apex is wide open in the very young patient, but where there is definite evidence of vitality in the pulp. Just as with pulp capping, so with pulpotomy, the cases selected for treatment by this method should be carefully chosen. The chief objective of the pulpotomy technique is to maintain the root portion of the pulp in a vital state until such time as complete formation of the root apex has taken place. Various techniques have been described through the literature, but the one used by the author is briefly as follows:—

The pulp in the exposed tooth is anaesthetized by infiltration or conduction anaesthesia. The tooth should be isolated and all instruments used must be sterile. The field of operation must be rendered aseptic and good access obtained to the coronal portion of the pulp with the use of sterile burs. With sharp instruments, preferably not burs, the pulp is severed at the level corresponding to the junction of the cementum and enamel. Haemorrhage may be controlled with campho-phenique. Bleeding will only be serious in cases where the pulp is lacerated. After the haemorrhage is controlled, a waiting period of five to ten minutes is allowed for serum seepage to take place. The pulp stump is then capped with a suitable capping paste such as calcium hydroxide and distilled water. Pressure on the pulp stump must be avoided in this process. Success in the pulpotomy technique is dependent upon sterility in every stage, careful severance of the pulp, and the avoidance of pressure in the capping procedure. Following completion of the operation, the tooth should be given a rest period of six to eight weeks. Within three to six months, evidence of a bridge of dentine at the line of severance of the pulp should be seen in an Xray. In addition, the radiogram may be used to follow the normal progression of completion of the root apex. If there is no evidence of root apex development within a reasonable period of time (say one year), then it is possible that failure has resulted. The use of the vitality test in these cases is not satisfactory. Detection of failure at an early stage, particularly before periapical breakdown occurs, permits one to proceed with root therapy for these cases. This brings us to the second common problem to be considered in relation to injuries to the teeth of children.

ROOT THERAPY.

Coolidge[2] has expressed admirably the objectives of root canal therapy. He writes: "The purpose of pulp treatment and root canal filling is to prolong the usefulness of a tooth so that it may function in mastication after the loss of the pulp, without harm to the host." We might add that in the case of the young patient where root therapy is indicated for a tooth which has been traumatized, the non-vital tooth is useful if only as a space maintainer during the period when growth and development of the arch is taking place. The loss of a tooth during this period presents us with a serious problem in replacement.

2. Coolidge, E. D.—Clinical pathology and treatment of dental pulp and periodontal tissues, Philadelphia, 1939, Lea & Febiger, p. 74.

The types of cases encountered under the heading of "Root Therapy" may include the following:—

1. The exposed vital tooth in which pulp capping or pulpotomy are contraindicated.
2. The tooth with a completely formed root apex which has become non-vital during the eight to ten week rest period following emergency pulp protection outlined previously.
3. The non-vital tooth with a wide open root apex.

You may be called upon to deal with any or all of these types in rendering service for traumatized teeth. As with any form of modern surgery involving bone (at the root apex) the fundamental consideration is maintenance of antisepsis not only of the instruments and dressings used, but also of the entire field of operation.

Vital pulp extirpation.

Anaesthetize the pulp by infiltration or conduction anaesthesia; isolate the tooth and sterilize the field of operation. Open the pulp chamber with sterile burs until good access is obtained to the canal. Remove the pulp and control the bleeding with sterile paper points. Enlarge the canals with reamers and files. The exact length of the tooth should be established by radiographic means. The length should be recorded on the chart. Irrigate the canal with chlorinated soda and hydrogen peroxide to remove all debris. (Always end irrigation with chlorinated soda). Dry the canal with large paper points. Remove the sharp point of a small paper point and moisten the balance of the point with eugenol. Place this point in the canal as a dressing followed by a pledget of dry sterile cotton in the pulp chamber. Cover the cotton with gutta percha and seal the orifice with temporary cement. Dismiss the patient for three to four days. At the second appointment, apply rubber dam and sterilize the field of operation and remove the dressing previously inserted. Proceed and make culture from the canal. With several large paper points absorb any excess medicament which may be left in the canal. Discard these points. Then remove a small paper point and insert it into the root canal, being careful not to traumatize the periapical tissues. Leave this point in the canal for one minute. Remove this point and drop into a tube of sterile culture media and incubate for 48 hours. Irrigate the root canal again with chlorinated soda and hydrogen peroxide. Dry the canal and insert a further dressing on a paper point and seal the canal as previously. The patient is dismissed for two to three days during the period of incubation of the cultured dressing.

If the bacteriological report is negative at the third visit, we may proceed with the obliteration of the root canal. Again all efforts should be made to obtain a sterile field of operation. With the aid of the radiograph measure the length of the canal. Gutta percha cones are selected which will fit snugly at the apex of the canal and are cut to the desired length. Dry the root canal with hot instruments or with alcohol and blasts of warm air directed toward the root canal. A mix of root canal cement is prepared on a sterile slab with a sterile spatula. Roll one measured gutta percha cone in the cement and use it to coat gently the inner wall of the root canal with cement. Carry the cone into the root canal until it is flush with the incisal edge of the tooth. Additional measured cones are placed in the canal and

with the aid of a No. 3 root canal spreader, these cones are condensed in the canal. The average canal will require many such cones before it is completely obliterated. Subsequent radiograms are employed to determine the success of this operation. When the filling is shown to be satisfactory radiographically, cut the gutta percha cones back to the floor of the pulp chamber with a hot instrument. Cleanse the pulp chamber thoroughly with chloroform and fill the canal with temporary cement.

Non-vital tooth with closed apex.

The author has observed on numerous occasions the development of an area of radiolucency about the apex of an injured tooth. These areas usually develop very rapidly and attain considerable proportions in a short time. Careful root therapy and obliteration of the root canal in these teeth usually results in just as rapid disappearance of the area of rarefaction. Therefore, it is well to proceed with the root therapy in these cases and delay subsequent root resection for a period of three to six months observing carefully further changes at the root apex following obliteration of the root canal. The procedure for treatment of the non-vital tooth, whether infected or not, is similar to that described in the previous paragraph for the vital tooth from which the pulp has been extirpated. The chief point of difference is directed toward the infection which may be in the canal. Great care should be exercised at all times to see that none of the infection is forced beyond the apex during instrumentation. The antiseptic dressings placed in the canal between appointments should be stronger and designed to take care of pathogenic organisms. The principle of drug rotation should be applied in root canal therapy, using two or three medicaments if necessary. The adaptation of the antibiotics to root therapy has greatly facilitated the establishment of asepsis in root canals.

The non-vital tooth with open apex.

The tooth with the open apex presents two additional problems. In the first instance it is relatively easy to push infection beyond the apex if one is careless with instrumentation. In the second place, completely obliterating the pulp canal to the apex and no further is a very difficult procedure. The detail in treatment is similar for this type of case to the cases already outlined except that great care should be used not to irritate the apical tissues. The filling of the canal is more exacting. Every cone used must be cut to the exact length of the tooth, and no cone must pass above the incisal edge of the tooth. Some of these large canals will require as many as twenty to thirty gutta percha points to obliterate the canal completely. Dr. G. C. Hare[3] recommends a modified lateral condensation technique for use in the tooth with an open apex.

Not infrequently root resection may be employed to eliminate stubborn infection at the apex of the tooth.

A Temporary Restoration for a Fractured Crown.

After a fractured tooth has been made comfortable with emergency treatment, and a period of eight to ten weeks has elapsed from the time of injury if the pulp is still vital, we are faced with the problem of restoration of the tooth. It is wise to regard the tooth as a sick tooth and not subject it to further irritation, in the process of preparing the tooth for

3. Hare, G. C.—Obliteration of the root canal with the open apex, Journal of Endodontia, 3:31-32, 1948.

the restoration. Failure to restore the tooth at this stage is to invite complications of serious proportions. Drifting of the fractured tooth, and of the teeth opposing the fractured tooth, may render the restoration of the crown at a subsequent time a very difficult problem. The length of time that this temporary restoration will be in place depends on the age of the child at the time of injury. It will vary from a few months to several years. Its replacement with a permanent restoration is dependent upon the normal physiological development of the tooth. While many other forms of temporary restorations have been used during the years, the gold and acrylic restoration has given the greatest degree of satisfaction.

Preparation of the tooth.

The amount of preparation must be kept to an absolute minimum consistent with the requirements for retention. The preparation of a normal three-quarter crown with grooves or a preparation with accessory pin anchorage may be dangerous at this stage. The limited preparation includes the paralleling of the proximal sides of the tooth, the clearance of the incisal and lingual surfaces for functional positions and the reduction of excessive contours of the lingual incisal enamel or the labial gingival enamel. The latter step is not usually necessary. Retention in this preparation is dependent upon the parallel proximal sides and the employment of a labial gingival band so that the metallic part of the restoration might be called an open-faced gold crown. An impression of the tooth is necessary and, for this purpose, two alternative techniques may be followed.

Impression of the tooth—compound technique.

This technique is similar to the routine indirect gold inlay technique employing the copper band impression and the preparation of a die seated in a cast. The electrolytically deposited copper die has been used with a great deal of satisfaction by the author for many years.

Impression of the tooth—hydrocolloid technique.

Recently, however, for reasons of greater accuracy, the hydrocolloid impression technique has been employed.

Select a water-cooled tray (either partial or full tray). Adapt two thicknesses of base plate wax over the tooth in question and the two teeth adjacent to it on either side. Place impression compound in the tray and take an impression of the mouth. Remove the impression from the mouth and from it remove the wax which had previously been adapted over the anterior teeth. Trim the compound impression so that it may be reseated in the mouth without impingement on the tissues. Prepare the equipment necessary for heating the hydrocolloid material. A syringe with a 19-gauge needle attached, suitable for heating hydrocolloid, is loaded with inlay hydrocolloid. Three water baths with automatic temperature controls are needed or three receptacles with thermometers to control the temperature manually. The water in these three baths should be kept at the following temperatures: the first at 208° F., the second at 140°-150° F., and the third 108° to 115° F. Both the general impression hydrocolloid to be used in the tray and the inlay hydrocolloid to be used in the syringe are softened at 208° F. for fifteen minutes. The syringe containing the inlay hydrocolloid is tempered in the bath at 140° to 150° F., while the impression hydrocolloid is placed in the tray and tempered in the bath at 108° to 115° F. for about four

minutes. Prior to proceeding with the impression the mouth must be cleansed with a caroid mouth-wash or something similar. Any air bubbles, blood, mucus or other debris on the surface of the tooth from which an impression is required must be removed, as these interfere with the hydrocolloid impression material. It is therefore recommended that the tooth in question should be dried, following which the hydrocolloid is injected from the syringe around the prepared tooth. The compound modified water-cooled tray loaded with hydrocolloid is carried to place in the mouth and water-cooled for four to five minutes. In order to get a good hydrocolloid impression, the material must be confined in a closed space and under pressure. After the impression is removed from the mouth, it is placed in a 2% potassium sulphate solution for five minutes, following which it should be poured immediately. The impression of the individual fractured tooth is first poured in hard stone or die stone or some similar material. It is reinforced with a brass dowel pin which is inserted while the die material is soft. The die stone is allowed to set while the impression rests in the potassium sulphate bath. After one and a half hours, remove the stone die from the hydrocolloid impression and trim. The trimmed die is reinserted in the impression and the balance of the impression is poured with stone. When the cast has set, the stone die of the fractured tooth may be separated from the cast. The die should be kept in a vegetable oil bath.

The open-faced gold crown.

Waxing up the restoration may be proceeded with according to standard techniques. The objectives in waxing up this restoration are to provide for strength in the casting, to avoid irritation of the gingival tissues, and to provide for the maximum amount of retention for the plastic veneer restoring the lost labial enamel structure. With the casting complete it is cemented on the fractured tooth and finished with careful attention to the aesthetic requirements. The lost incisal corner may now be restored with acrylic resin. In some instances, it will be found more satisfactory to place a thin veneer over the entire labial enamel surface.

SUMMARY.

In this paper I have discussed some of the general problems faced by the practitioner in handling injuries to the teeth of children. The three most common aspects of treatment have been presented. The pulp must always be regarded as being involved until time has proven that it still functions normally. All cases of exposure of dentine must receive protective treatment and cases in which the pulp is directly involved will require immediate attention.

Unfortunately, many of these cases end with the tooth becoming a pulpless tooth and, because of their importance as space maintainers at least, every effort should be made to retain the teeth even in a pulpless state. Prior to the restoration of the injured tooth with a filling that might be regarded as permanent it is very frequently necessary to place a temporary restoration for an indefinite period of time. We have briefly outlined procedures for all these cases.

ASPECTS OF DENTAL HEALTH ACTIVITIES IN NORWAY*

GUTTORM TOVERUD, T.L., PH.D.†

In 1902 the Norwegian Dental Association completed a survey on the dental health of 8,000 school children ranging from 7 to 15 years of age. This investigation revealed the sad picture of 99 per cent. caries-attacked children and an average of 37 per cent. caries-affected permanent teeth. Using these figures as a background, the Dental Association embarked on an intensive propaganda campaign for establishing school dental clinics. It was, however, not until 1910 that Oslo, the capital of Norway, started the first school dental clinic. Many other cities and rural communities, too, followed very soon the Oslo plan. These clinics were supported wholly by the municipalities—thus free to the children—and directed by the local school authorities. Many of the local municipalities, however, had economic difficulties in supporting these clinics, but in 1917 the Parliament passed a bill with the effect that the State should pay one-fourth of the salaries, later changed to one-eighth for the cities. At the same time the Parliament passed a law entitling all children in the city public schools, that is the age group from 7 to 14 years, to free dental treatment if so desired. The time lag in fulfilment of this law was stretched over 10 years. The law has later been extended to cover also the rural districts.

Partly on account of poor economic conditions in many municipalities and partly on account of shortage of dentists, the fulfilment of the law had to be postponed.

Today 80-85 per cent. of the public school children have treatment in the schools. Conservative treatment of the temporary teeth, however, has not been regular; mostly extraction of these teeth was undertaken.

From 1938 some urban as well as rural municipalities have started clinics for children from 3 to 7 years and from 14 to 18 years, thus giving systematic yearly treatment from 3 to 18 years. This treatment before and after the elementary school period is not free. Families with a certain income have to pay a small yearly fee. Teen-agers from 14 to 18 years attending a special school (in rural districts) may have free treatment. Orthodontic treatment has been included in the plan to a certain extent in the more wealthy communities. Those who are able to pay a reduced fee are requested to do so.

From 1911, Norway has had a compulsory health insurance for lower income classes, giving the employees and their families economic help for medical treatment. In the term medical treatment was also included some dental treatment, as for instance extraction of infected teeth, removal of cysts and impacted teeth, apicoectomy, and treatment of infections of the soft tissue of the mouth.

In 1939 the law for the health insurance was changed, permitting the local organizations, if they have a certain economic status, to give economic help also for *ordinary* dental treatment at a special rate. So Oslo in 1942 started a plan entitling the members of the health organizations from their eighteenth

*Presented at the Twelfth Australian Dental Congress, Sydney, August, 1950.
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year, on request, to economic help for every kind of dental treatment, prophylactic as well as therapeutic. The amount the patient is refunded is fairly close to the fee charged by the average private practitioner. The patient may choose the dentist he prefers. Such economic help is conditioned by the patient having had systematic treatment from 7 to 18 years of age, either in public clinics or by private practitioners, and by his visiting the dentist at least once a year. According to this law, expenditure for orthodontic treatment at any age may also be refunded but, except in rare cases, at a lower percentage basis than for ordinary dental treatment[1].

The plan inaugurated by Oslo is also in practice in several other cities as well as in a few rural communities.

By 1947, about three-fourths of the population in Norway belonged to the compulsory or voluntary health insurance scheme.

Private health organizations have supported dental treatment of preschool children and teen-agers as well as elementary school children in some localities.

It has also to be mentioned that children and teen-agers in homes and clinics for the blind, deaf, and crippled persons are entitled to ordinary dental treatment, either by a dentist connected with the institution or by a private practitioner. Free dental treatment to a certain extent is also given in the Army and Navy. Dentists are connected with the larger sanatoriums, hospitals, and prisons. In spite of the fact that Norway for many years has had a systematic dental service for the children in the age group 7-14 years, not more than about 25 per cent. of the total adult population may be said to have regular yearly dental treatment.

In order to qualify the dentist to work in the children's clinics, special courses in pedodontia have been included in the students' curricula in the Dental School of Norway ever since 1924. From 1931 the School has had a pedodontic department conformatory with the other departments.

In 1924-25 we had the first official course for training dental hygienists. On account of the poor economic condition in the country during the subsequent years, no further training of dental hygienists was undertaken until more than a decade later. The dental hygienists are employed only by the public dental clinics to do prophylactic work and are not allowed to do any therapeutic caries treatment.

Prophylactic Measures.

School Breakfast.

As may be learned from the introduction, the caries frequency in Norway has been very high during this century. It was therefore clear to the medical and dental profession that it would be hopeless to combat dental caries by regular therapy alone. Prophylactic measures had to be put into practice as far as such were known to exist. The training of dental hygienists, as mentioned above, was one step. As another measure in this direction the so-called "Oslo breakfast" was introduced into the public schools of Oslo in 1926 by Dr. Schiotz, the Chief School Medical Officer[2]. This breakfast consisted of

1. Grythe, O.—A survey of the support given by the Oslo Health Insurance Office for social dental service in the years 1942-47: Acta Odont. Scand., 8:213, 1949.
2. Schiotz, C.—Complete reorganization of lunch service in schools of Oslo: Nord. Hygien, Tidskr, 8:1, 1927.

whole-wheat bread with butter and cheese, hard bread or crackers with butter and cheese, one-third to one-half litre of whole milk, codliver oil from September to May and, as the last part of the meal, a carrot or an apple. The breakfast, originally intended for poor children only, very soon became a factor in the prophylactic health work and in some communities open to all school-children regardless of economy. In many rural schools the so-called "carried Oslo breakfast" is introduced. The children are asked to bring with them for school luncheon the same kind of food as the original Oslo breakfast contains. This is the most popular form in the rural districts.

Before the Second World War, about 37 per cent. of the elementary school-children in the cities and about 25 per cent. in the rural districts participated in the Oslo breakfast in the one or the other form.

No extensive study has been made to examine the effect on the teeth of this school meal. Studies of rather small groups, however, point in the direction of a decreased caries frequency in children participating in the meal, compared with classes not doing so.

It was, of course, not anticipated that this single meal *per se* once a day during the school days would change the dental condition to any large extent. But it was hoped, however, that this school meal would influence the daily menu in the homes and thereby become a more potent instrument in the dental prophylaxis.

In day nurseries and similar institutions for children, the same breakfast has been introduced.

The Norwegian Association for combatting dental diseases, started in 1911, has been an active factor in promoting the establishment of school dental clinics as well as in introducing the Oslo breakfast in the schools. This Association has issued and distributed numerous pamphlets besides a regular popular dental magazine.

Outpatient clinics for mothers and children.

As an experiment in order to see if it would be possible to decrease the caries frequency in children in larger populations, special outpatient clinics for mothers and children have been erected in some places in Norway. The first of these so-called "health stations" was started in 1936 in a rural community, Skedsmo, about fifteen miles outside Oslo. A similar one was started in the capital in 1939.

The health supervision, both in the rural district of Skedsmo and in Oslo, was started in the prenatal period by supervision of the pregnant women and continued throughout the infant's first year up to 7 years of age. The supervision was performed at a health station where pregnant and lactating women, infants and children of preschool age were regularly followed up at frequent intervals. All tests necessary to clarify the status of health of mother and child were carried out at the health station.

An important part of the supervision was the teaching programme for the mothers in the right choice of food for themselves and their children and how to prepare this food. At the station in Oslo this was given to the mothers by a dietitian who weekly demonstrated the desirable choice and preparation of the food to be consumed during pregnancy, infancy and the preschool-age period.

The food recommended was such that it should meet the requirements during the various growth periods, particularly as far as the calcifying factors are concerned. Thus an endeavour was made to raise the intake of calcium up to 1.6 gm., phosphorus to 2 gm., and iron to about 20 mg. daily, by recommending the natural food articles such as milk, meat, fish, whole-wheat bread, fruit, and green vegetables. By advising one tablespoon of codliver oil, the daily vitamin intake exceeded 7,000 I.U.A. and 700 I.U.D.; 15 to 30 gm. of brewer's yeast was given to most women in order to raise the various vitamin B factors of the diet. Extra vitamin C was also added when considered necessary. During infancy two teaspoonsful of codliver oil were given from one month of age, whether the infant was breast-fed or bottle-fed, and the same dosage was continued throughout the whole preschool period as well. Whole-wheat was given as cereal from the sixth month of life. Vegetables were recommended in cooked and raw form according to the character of the stools. After eruption of the teeth the importance of ending the meals with raw carrot or turnip, or, if possible, fruit was emphasized.

An important point in the diet regulation for both mothers and children was the low content of sugar, sweets and refined carbohydrates such as cookies and pastry. During the war years this regulation was easily fulfilled as the sugar ration was just 30-38 gm. per day and the sweets and other refined carbohydrates disappeared during the war. Thus, the diet recommended in this health programme was high in protective foods and low in sugar, sweets and other refined carbohydrates.

The influence on the teeth in the rural municipality of Skedsmo.

The health work was started in this municipality by the initiative of Dr. Henriksen, partly in co-operation with the Pedodontic Department of the Dental School. The teeth of the preschool-age children, from 2½ to 7 years of age, were examined before the health work started in 1936 and each of the years 1938 to 1940. In the last year (the outbreak of the war in Norway) only the three youngest groups were included. On account of the war the dental examination was stopped until 1944, but from then it has gone on every year.

The dental examination was performed by the staff of the Pedodontic Department, including myself. The method of examining and recording has been the same throughout the whole period. From the year 1944 we have just taken into account the upper and lower right half of the dental arch. However, if no caries nor filling was found on the right side, the left side also was examined.

Examination of the teeth was performed by means of a mirror and a sharp explorer. The teeth were not cleaned by the examiner but almost every child had had his teeth brushed at home.

In recording, missing molars were taken as carious, but missing front teeth were not taken as such unless this was stated by the mother of the child.

In preparing the tables, the molars were considered to have five and the six front teeth to have four surfaces each. Extracted teeth were counted as three affected surfaces.

Results.

On account of the marked general decrease in caries frequency during the war, the most exact picture of the influence of the health work will be

obtained by excluding the figures for the war years. Therefore, Tables I, II and III comprise only the years 1936 to 1940 inclusive.

As will be seen from Table I, the number of children examined in the age group 2½ to 3 years is very small, but the representation is between 60 to 70 per cent. of the total population of that age group.

TABLE I.

Dental Examinations in Skedsmo

2½-3-year-old children

Year		Number of Children	Percent Children with Caries	Percent Teeth with Caries	Percent Tooth Surfaces with Caries
1936-37	I	23	78.3	27.1	8.0
1938		35	57.1	12.1	3.7
1939	II	40	50.0	17.6	5.4
1940		43	44.2	13.1	3.9
Difference I-II					
Standard error of difference			3.0	2.4	

I Not controlled at the Health Station.
II Controlled at the Health Station.

The percentage of caries-affected children dropped from the very high level of 78 when the health work started in 1936, down to 44 in 1940. No child above 1 year of age could enter the station. Thus the first "health children" were included in the statistics in 1938. The percentage of DMF teeth dropped from 27 to 13 and the percentage of caries-affected surfaces decreased from 8 to 4. It will be seen from the column "caries-affected children" that the difference between the mean value of the years 1938, 1939, and 1940, and of the years 1936-37 is statistically significant. The same is true for "caries-affected teeth."

TABLE II.

Dental Examinations in Skedsmo

Three-year-old children

Year		Number of Children	Percent Children with Caries	Percent Teeth with Caries	Percent Tooth Surfaces with Caries
1936-37	I	88	92.0	45.5	17.8
1932		61	90.2	38.7	15.6
1939	II	53	84.9	30.0	9.0
1940		37	83.8	36.1	12.1
Difference I-II					
Standard error of difference.			1.5	3.1	

I Not controlled at the Health Station.
II Controlled at the Health Station.

Table II comprises the children in the age group of 3 years. In this group there is no child belonging to the health station before 1939. Corresponding to this we find a marked decrease in caries-affected children and teeth as well

as in caries-affected tooth surfaces this first year, compared with the years 1936 to 1938. In the column "per cent. teeth with caries" the difference in the values from the health station years and the period preceding the start of the health station is statistically significant.

TABLE III.

Dental Examinations in Skesdmo

4-year-old children

Year		Number of Children	Percent Children with Caries	Percent Teeth with Caries	Percent Tooth Surfaces with Caries
1936-37		92	98.9	51.3	23.4
1938	I	58	98.3	49.5	22.1
1939		38	97.3	49.9	22.3
1940	II	37	94.6	41.7	14.9
Difference I-II					
Standard error of difference.			1.1	1.9	

I Not controlled at the Health Station.
II Controlled at the Health Station.

In Table III, comprising the age group of 4 years, there is no child from the health station before 1940. Corresponding to this we do not find any decrease in the percentages of caries-affected children, teeth or tooth surfaces before this year. Nevertheless, the drop in the percentage of caries-affected teeth seems rather marked, the difference between this figure and the average figures for the years prior to the children receiving treatment is not statistically significant, but may be regarded as probably significant.

The Sagene Municipal Health Station in Oslo.

As mentioned above, in 1939 a similar health station was opened in Oslo covering an area corresponding to one-fifth of the population of the city. Here the mothers as well as the children were under an even closer supervision than in the former station. Vitamin studies of blood, urine and breast milk as well as calcium and haemoglobin studies of the blood have been performed.

The regimen at this station has been of great value in improving the general health of the pregnant and lactating women and of the infants as well as of the children. The common disorders during pregnancy, such as anaemia and albuminuria, were greatly reduced. The lactating power of the mothers increased in spite of the fact that this ability is commonly high in Norway. The stillbirth rate, the neo-natal as well as the total infant mortality rates have been reduced about 50 per cent., compared with the respective figures for Oslo as a whole. The prematurity rate was markedly lowered, and no birth haemorrhages occurred. Rickets was totally eliminated and even the milder pathological bone changes practically disappeared. The detailed results of these studies will be seen from the extensive report (1946) by Dr. Kirsten Utheim Toverud[3], the director of the Health Station, and from a summary in English (1950) by Guttorm Toverud[4].

3. Toverud, K. Utheim—Beretning om de forste 6 ars arbeid ved Oslo kommunes helsestasjon for mor og barn pa Sagene 1939-1944. (English Summary) Fabritius & Sonner, Oslo, 1946.
4. Toverud, G.—The influence of nutrition on the course of pregnancy: Milbank Memorial Fund Quarterly, 28:7, 1950.

The pregnant mothers as well as the children from one and a half years of age have been under the care of the dentist connected with the health station. From the age of one and a half years the child each time has to pass the dentist for examination of the teeth and mouth before entering the pediatrician's office. By this regime the physician has the present dental status of the child and is able to take this into account in his dispositions.

The influence on the teeth at the Sagene Municipal Health Station in Oslo.

Unfortunately, no dental examination was performed of children from this part of the city before the health work started. It is, therefore, impossible to make the same comparison as in Skedsmo between caries frequency before and during the health supervision.

TABLE IV.

Sagene Health Station, Oslo

Percentage of carious teeth in children admitted to the station before and after one year of age.

Age Group	Before one year (a)		After one year (b)		Difference between (a) and (b) Divided by Standard Error of Difference
	Number of Children	Percent Carious Teeth	Number of Children	Percent Carious Teeth	
2½-3 y.	563	5.1	114	10.8	4.74*
3 y.	554	16.1	200	25.4	5.60
4 y.	332	31.6	191	40.7	4.08
5 y.	123	36.8	171	48.7	3.95
6 y.	21	54.5	129	58.9	0.74

* A quotient larger than 2.5 is considered to mean a *significant* difference.

The effect on the teeth of the health supervision at this station has been recorded by a dentist and a dental hygienist. As mentioned before, dental examinations were made of every child over 1½ years of age. The children were re-examined at least twice a year and any necessary dental treatment was carried out. The findings for the children aged 2½ years and upwards were incorporated in the statistical tables. The children are divided here into two main groups:—

a. Those who came to the health station *before* 1 year of age.

b. Those who came to the station *after* 1 year of age.

In this way we may be able to see the possible difference in effect on the condition of the temporary teeth of health supervision *during* the whole mineralization period of the teeth and only *after* the primary mineralization period. It would have been desirable to divide the material into several principal groups according to the time of the first visit to the station, but the number of children in each such group was too small. The two main groups have again been divided into the various age groups as mentioned. Table IV and Figure I show that there is a marked difference in the percentages of caries-affected teeth and tooth surfaces between the children supervised *before* 1 year and those supervised only *after* 1 year of age. In the eldest age group, 6 to 7 years, the difference is less. But the number of children in the first section of this age group is too small to allow any conclusions to be drawn.

Statistical evaluation of the figures in this Table shows that the difference is significant except for the oldest age group.

Unfortunately, we are not able to compare the caries incidence of the health station children with other children from the same region of Oslo, either before the station was opened or afterwards. But this Table demonstrates that health supervision during the mineralization period according to

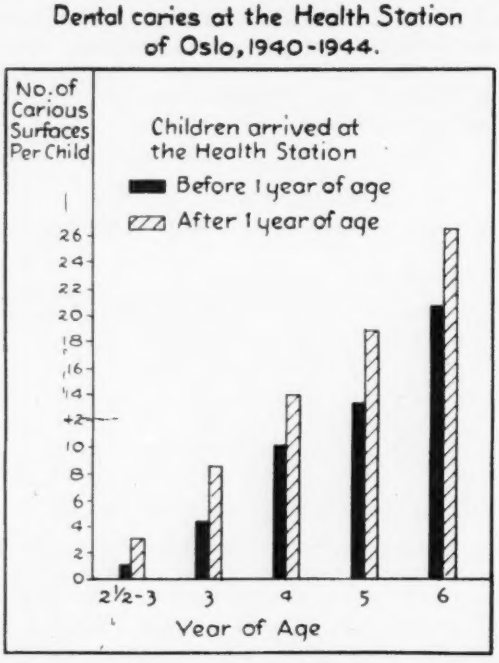

Fig. 1.—This figure demonstrates the difference in number of carious surfaces in the temporary dentition between children arriving at the Sagene Health Station in Oslo *before* one year and *after* one year of age. The total number of children represented in this graph is 2,308.

the system practised at Sagene Station gives a lower caries rate in preschool-age children than does health supervision commenced just after the primary mineralization period.

Thus it has been demonstrated that close health supervision and diet regulation of mothers and young children at special health stations has led to a decrease in caries frequency during preschool age. To what factor or factors is this improvement in dental health to be attributed? At present we are not able to give any closer answer than this: the whole regimentation may have increased the resistance of the teeth and reduced the direct caries-producing factors. For further discussion the readers are referred to *British Dental Journal*, 86:191, 1949.

Many other municipalities, both rural and city, have established health stations for mothers and children or for children alone. Some are supported wholly by the municipality and some solely or partly by private health organizations. The state gives grants to well-organized health stations.

Not strictly pertaining to the topic, but since it confirms in the most definite way the relationship between diet and dental caries, I should like to mention briefly:

THE INFLUENCE OF THE WARTIME CONDITIONS ON THE CHILDREN'S TEETH IN NORWAY.

The biggest dietary experiments ever seen, those forced upon mankind by the Second World War, had a much greater influence upon the caries frequency than had the special health service for mothers and children. The decrease in

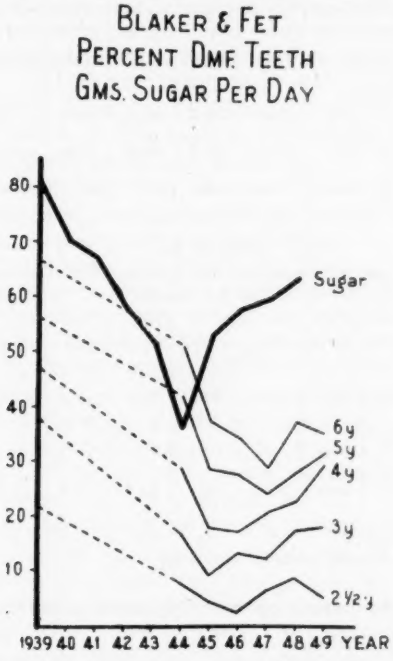

Fig. 2.—The light curves demonstrate per cent. DMF temporary teeth in pre-school children from the rural municipalities Blaker and Fet. Between 1939 and 1944 no dental examination was performed. Note, in the three youngest age groups, the lowest point on the curve is in 1945 and 1946. In the two oldest groups the lowest point is in 1947. The heavy curve illustrates the total consumption of sugar in grams per day per capita, according to calculations by H. Skaarer. Note the lowest value in 1944.

number of caries-affected tooth surfaces ranging from 50 to 80 per cent. in children 2½ to 14 years of age was the most striking evidence of the possibility of reducing the caries incidence by dietary means. This decrease made it possible not only to keep up the treatment of the same number of children in the school dental clinics during the war, in spite of serious difficulties for the clinics, but even to take into the clinics children below and above the regular age groups.

Only a few examples will be given here on the change in caries frequency during and after the war based on yearly studies of 600-700 pre-school children and about 8,000 school children in various districts outside Oslo. At the same

time some caries figures from the yearly reports of the Oslo municipal school dental clinics are given.

Figure 2 demonstrates clearly the great reduction in carious temporary teeth during the war and during one or two post-war years. Later on, however, we see the curves are going up again. Table V illustrates the change in the number of DMF permanent teeth in boys from a group of smaller cities and Table VI shows the great reduction in caries in Oslo children.

TABLE V.

The percentage DMF teeth of specified teeth in children from a group of smaller cities in Norway.

	1940/41	41/42	42/43	43/44	44/45	45/46	46/47	47/48	48/49
Maxillary tooth No. 6 in 7-year-old boys	70.8	58.0	54.7	48.8	50.8	35.9	40.3	54.4	46.8
Maxillary tooth No. 7 in 13-year-old boys	57.8	49.1	54.9	45.5	37.6	41.6	48.4	46.2	48.5
Maxillary tooth No. 1 in 13-year-old boys	56.3	64.6	55.9	55.8	46.3	37.8	32.9	35.2	42.7

TABLE VI.

Number of caries centra* per 100 permanent teeth reported for the years 1937/38 to 1947/48 from Oslo Municipal School Dental Clinics by the director, Dr. T. Gythfeldt.[5]

	1937/38	38/39	39/40	40/41	41/42	42/43	43/44	44/45	45/46	46/47	47/48
In grade 1 children	91.5	86.9	85.9	90.4	76.1	75.9	49.3	44.4	38.9	43.7	52.2
In grade 7 children, increment from the 6th grade	44.0	37.8	35.4	34.9	24.1	22.3	18.7	14.7	23.2	23.8	30.7

* Including decalcifications.
About 2,000 children in each grade in each year.

This change in the caries picture has taken place under the following:

Food and nutritional conditions.

Nearly all food articles were rationed during the war.

Milk: Pregnant and nursing mothers and children up to 6 years of age were allotted 0.75 litre of whole milk per day. Pregnant and lactating women had also the usual amount of 0.25 litre of skimmed milk as was the ration for adults. Children from 6 to 16 years got 0.5 litre.

Codliver oil: Preference was given to pregnant and nursing mothers and preschool children. School children also had access to it, but not as regularly as the groups mentioned. The over-all use of codliver oil, however, was higher than before the war.

Cheese: This was very seldom obtained on the coupons and the average amount per day was about 2.5 gm.

Fat: The ration of margarine and butter was 30 gm. daily as an average.

5. Gythfeldt, T.—Beretninger fra Oslo Kommunale Skoletannklinikker 1937/38-1947/48. Oslo.

Beef and pork: Was very scarce. In 1943 and 1944 the daily ration of beef was only 7-8 gm.

Potatoes: The ration was about 400 gm. per day.

Flour: The average ration was 200 gm. per day. Most of the time it was of 95 per cent. extraction, and from the fall of 1942 it contained 0.4 per cent. calcium carbonate.

Sugar and syrup: The daily ration, together with the sugar for canning, was 38 gm. (the syrup figured as sugar). The sugar ration to bakers and industrial concerns was constantly lowered during the war so that the amount in 1944 was just one-fourth of what was used in 1939 for the bakeries, and one-eighth for the industry. As a result of this, sugared cakes and cookies, chocolate, candy, marmalade, etc., disappeared more and more from the market. During most of the war, candy was not available at all.

Fish: Was not rationed. The average consumption has been calculated to be 300 gm. per day, mostly salted and dried fish.

Vegetables and fruit: Were not rationed. The consumption of vegetables, especially of carrots and turnips, was much higher than before the war, whereas the consumption of fruit was much less.

Summing up the dietary conditions for children up to 14-15 years of age it may be stated: The caloric intake was sufficient up to 6 years, probably sufficient from 6-12 years of age, but deficient above 12 years. The total protein intake was sufficient, but very little meat protein was available. The fat intake was probably sufficient up to 12 years of age, but much too low later. The same is true for the carbohydrate intake. The amount of the different vitamins and minerals, except for iron after 12 years of age, should be sufficient. This general characteristic is in the main in accordance with the result of household studies of seventeen Norwegian families in 1942 to 1945, reported by Strom[6].

The most pronounced changes in the diet during the age period from fetal life up to 15 years, were the radical decrease in refined carbohydrates, including sugar and all kinds of sweets. This is also true for meat. As a compensation, more flour of high extraction, more potatoes and vegetables, and more fish were used. The daily intake of milk and codliver oil was probably more regular, as was the whole daily diet. The between-meal eating of cookies and sweets disappeared almost completely.

However, that the war diet was inferior to that before the war for the physical development of older children is demonstrated in Oslo school children (Stoltenberg). From 1940 to 1945 was found a distinct decrease in the height and weight of 8- to 14-year-old boys and girls. In 1947 the curves have gone up again and even passed the values for 1940. No exact data are at hand for the preschool children, but one got the impression that they were not physically handicapped as were the school children. The emergence (eruption) of the permanent teeth was delayed in some groups.

The caries figures have shown that the decrease in caries could already be noticed a year after the war started and continued for one, two, or even three years after the war ended and the consumption of sugar increased. (See Fig. 2.) Based on these observations and the dietary description, the following tenta-

6. Strom. A.—Examination into the diet of Norwegian families during the war years 1942-45: Acta Med. Scand. Suppl. CCXIV.

tive conclusions concerning the causation of change in caries rate may be drawn:

a. The decrease in caries during the first years of war may be caused by the drastic reduction in consumption of sugar, sweets, and other refined carbohydrates reducing the environmental factors.

b. The continued yearly reduction in caries also after the increase in refined carbohydrates may be attributed to an increased resistance of the teeth during the pre- and post-eruptive mineralization, respecting maturation brought about by the special war diet[7, 8].

c. The increase in caries frequency later may be explained by a break in the balance between the resistance and the direct caries-producing factors.

Also in Finland, Denmark, and to a limited degree in the neutral Sweden, as well as in other war-torn countries, a reduction in caries frequency has been observed. A more detailed discussion may be found in the publications of G. Toverud[9, 10].

A New Public Dental Health Plan in Norway.

When the war ended, the Norwegian Dental Association took up the old question of public dental clinics all over the country for the population, besides the public school children. On request of the Association, a Government committee was appointed in 1946 to draw up a plan for a more efficient and broader public health dental service for the whole country. The proposed plan having been thoroughly discussed[11], and also to some extent critized by different bodies, including the dental organizations and the Faculty of the Dental School, has with some alterations been approved by the Parliament as an Act in July, 1949, and the law will be put into action by July 1, 1950. The main paragraphs of this Act are as follows:

"1. A public dental service shall be put into operation, in pursuance of the provisions contained in this Act.

Public dental service shall provide for:

A. Dental treatment of young persons between the ages of 6 and 18, for which no charges shall be made. (Non-paying clients (*sic*).)

B. Dental treatment for the rest of the population, at rates of payment to be fixed by the competent Ministry. (Paying clients (*sic*).)

The Crown may, subject to the approval of the Storting, prescribe that for the whole of Norway, or parts of it, the category of non-paying clients may include the additional age group between the years of 3 and 6.

2. Public dental service administration and management are assigned to the county authorities; in districts covering one town only, the town council is the body responsible for these matters.

7. Sognnaes, R. F.—Caries-conducive effect of a purified diet when fed rodents during tooth development: J.A.D.A., 37:676, 1948.
8. Sognnaes, R. F.—Analysis of wartime reduction of dental caries in European children: Am. J. Dis. Child., 75:792, 1948.
9. Toverud, G.—Dental caries in Norwegian children during and after the last World War: Proc. Roy. Soc. Med., 42:249, 1949.
10. Toverud, G.—The influence of general health supervision on the frequency of dental caries in groups of Norwegian children: B.D.J., 86:191, 1949.
11. Bryhn Ingebrigtsen, S.—Problemer i tilknytning til Norges overgang fra skoletannrokt til folketannrokt. Norske Tannl. Tidende 59:480, 1949.

3. Each county shall be divided into separate dental service districts consisting of one municipality or a number of municipalities.

4. A. In each county excluding Oslo and Bergen, a county dental officer shall be appointed. In special cases the county dental officer may hold the office of district dental officer.
The county dental officer shall exercise supervision over the public dental service in the districts of the county concerned. He may participate in the meetings of the public dental service committees, and in the consideration of dental service questions by the county council, but he shall not be entitled to a vote.

B. In Oslo and Bergen the position of a dental officer-in-chief shall be set up. The dental officer-in-chief may hold the office of city dental officer.

5. For the operation of the public dental service, there shall in each dental service district be at least one district dental officer (town dental officer) Class A, and the necessary number of district dental officers (town dental officers) Class B and Class C.

Dental officers (Class A) shall be appointed by the Crown, but they shall not have the rank of Crown officials. They shall be deemed to be Government civil servants and shall be covered by the provisions contained in the Act, respecting public civil servants, of 15th February, 1918.

Dental officers (Class B and Class C) shall be appointed by the respective county executive committees, in town districts by the town council concerned, or by bodies thus empowered by them. Appointments shall be subject to the approbation of the competent Ministry.

In districts with more than one dental officer (Class A) the competent Ministry shall decide which person shall be in charge of the dental clinic(s).

6. In each dental service district auxiliary personnel shall be appointed in such numbers as may be required.

7. A county or a town municipality, constituting a dental service district of its own may undertake appointment of dental officers specially trained in orthodontics and oral surgery.

8. The Crown, or the person or persons authorized by the Crown for that purpose, shall issue further rules respecting the term of office of dental officers, and its apportionment between paying and non-paying clients.*

9. Salaries and wages for dental officers and for auxiliary personnel of the public dental service shall be fixed by the Crown, subject to approval by the Storting.

*In the preparation of the law it has been proposed that class A dentists should devote 1,000 hours a year to the free clientele and 900 hours to the other. Class B dentists should practise only for the free clientele. Class C dentists should practise for both groups according to need. (The author's remark.)

District (city) dental officers shall be required to relinquish their position when attaining the age of 65 years, unless otherwise stipulated by the Ministry.

Subject to the approval of the Storting, the Crown shall issue the provisions required for a pension scheme concerning the personnel of the Public Dental Service.

10. . . . . .

11. In each district there shall be in operation a dental service committee which is to be composed of the district dental officer, Class A (the manager), and a minimum of two other members. Members with their personal deputies are appointed for a period of 4 years at a time, the appointments being made by the county executive committee, and in town districts by the town executive committee. The committee itself elects its chairman and deputy chairman.

12. In each dental service district there shall be in operation at least one permanent dental clinic.

The clinics and their equipment must be approved by the Ministry.

13. . . . . .

14. The county authorities concerned (the town authorities), may rule that certain groups of the population shall be granted priority in dental treatment after the non-paying clients, but over other patients.

15. A. In respect of the non-paying clients dental treatment shall include:

1. Complete and systematic operative and surgical treatment, as well as necessary prosthetic treatment.

2. Orthodontic treatment, to such extent as is possible in consideration of the dental officer's pressure of work.

B. Dental treatment of paying clients shall be undertaken to such extent as is possible in consideration of the dental officer's pressure of work.

C. Caries prophylactic or preventive treatment as well as dietary guidance shall be undertaken, in pursuance of directions issued by the competent Ministry or by a person or persons thus authorized by the Ministry.

The competent Ministry shall issue detailed rules respecting the extent to which application shall be made of this section.

16. . . . . .

17. All expenses relating to the Public Dental Service shall be met by the county concerned, in town districts by the town municipality.

Counties introducing Public Dental Service in virtue of this Act are granted a Government contribution of 60 per cent. of the expenses relat-

ing to Public Dental Service salaries and wages, and to the county dental officers' duty travel expenses.

Town municipalities introducing Public Dental Service as mentioned above are granted a Government grant of 30 per cent. towards public dental service wages and salaries.

Following the required approbation of the Storting the Government contribution may be increased to 80 per cent. of the county expenses, and to 40 per cent. of the town municipality expenses relating to public dental service salaries and wages. The competent Ministry shall decide which counties and town councils shall receive Government contributions, and shall also decide on the actual amount to be granted in each individual case.

Counties introducing Public Dental Service in virtue of this Act may be granted by the competent Ministry a certain specified contributory sum for the purpose of buying dental clinic equipment. The exact amount of this contribution shall be fixed by the Storting in respect of each budget period, and shall be apportioned by the competent Ministry among the respective counties in accordance with the rules issued by the Ministry.

18. The municipalities covered by the Public Dental Service in the county concerned, upon the adoption of an approved decision pursuant to section 16, shall make the county a contribution of kr. 5 annually in respect of each person residing in the municipality and entitled, in conformity with section 1, to free treatment under the Public Dental Service.

The municipalities shall be required to meet the expenses relating to the rent of dental clinic premises.

The County's net expenses, following the deduction of Government and municipal contributions, shall be borne by the county and the town municipalities, according to the number of persons entitled to free dental treatment from the Public Dental Service. The same method shall be observed for the apportioning of expenses that have to be met jointly by a number of municipalities within one and the same public dental service district.

19. . . . . .

20. Public Dental Service, as provided for under this Act, shall be put into operation for the whole of Norway not later than 15 years after the coming into force of this Act.

The expenses relating to public dental service shall be met in pursuance of the provisions of this Act in accordance with the gradual application of the Act.

. . . . . ."

This new dental health plan which was unanimously accepted by the Parliament means an enormous improvement on that which we have today. One of the most important changes this plan will make in the picture is that the dentists will be more evenly distributed between cities and rural districts. Norway has slightly above 1,600 dentists for a population of 3.1 millions. This

makes one dentist per 1,900 individuals, and is a fairly good proportion compared with many other countries. But as the relation between the population in cities to that in rural districts is 3 to 7, and the distribution of the dentists is just the *opposite*, it will be understood that something was wrong and had to be changed.

Another great improvement is that the children regularly will enter the clinics at the age of 6 years instead of at 7 years as before. In this way it should be possible to combat the early advanced destruction of the first permanent molar, which so often has led to extraction of this tooth. However, the Faculty of the Dental School as well as the Dental Association, in their remarks to the proposed plan, firmly stressed the necessity of regular free treatment from 3 years of age in order to keep the child's mouth in a functional and hygienic condition. They also pointed to the physical as well as the psychic effect of malocclusions and hence wanted the clinics to devote more time to the preventive and early treatment of the simpler cases of malocclusions, and treatment of the more advanced cases in special clinics.

As the last, but not at all the least, improvement covered by this plan, which I want to mention, is the stressing of *prevention*. With the high caries rate in young children as well as in older children and in teen-agers in most of the civilized countries today, more attention should be devoted to prevention than has hitherto been the case. Unless it is possible to reduce the number of caries attacks in the young generation, it will be impossible to give adequate therapeutic treatment to the whole population. I do not think any country will be able to train a sufficient number of qualified dentists and spend money for all the reparative work needed as the situation is today.

But do we know how to prevent dental caries today?

In this paper is demonstrated a reduction in dental caries in children by a systematic out-patient health work for mothers and children. The reduction in consumption of sugar and other refined carbohydrates and the replacing of some of these calories by more natural foods, forced upon the population by the war condition, resulted in a drastic drop in caries rate. These studies are in agreement with many others reported.

Laboratory tests and a few clinical studies on the effect of anti-enzymes and anti-bacterial agencies are promising. The topical application of fluorine has resulted in reduction of dental caries. If the few, but strongly positive, preliminary results of adding fluorine to the drinking water will stand up after more years of examinations, it seems that this preventive measure will constitute the most effective and economical one known today. But unfortunately this prophylaxis seems today to be restricted to populations having community water supplies.

Thus, we may answer our question above positively. However, much research work has still to be done in order to clarify the complexity of aetiological factors in dental caries. Before we know all of these, the degree of success of our prophylactic measures will depend a great deal on chance. It should, therefore, be a good investment of money for every country interested in the dental health of its population to spend funds for research in the aetiology and on prophylactic measures for the control of dental caries.

TREATMENT OF CHILD PATIENTS IN GENERAL PRACTICE*

W. D. SUTHERS, D.D.S.

The importance of early and continued dental care of the school and pre-school age child is becoming universally recognized both by the profession and the public at large. The modern trend in dentistry as in medicine is "prevention rather than cure," and our efforts should be devoted more and more towards perfecting preventive measures rather than control or restorative measures.

From a technical standpoint, children's dentistry has made great strides in recent years, yet the fact remains that the treatment meted out to children in the average dental practice is far from adequate or in keeping with our increased knowledge. In many cases they are given only token service, the treatment being carried out with a minimum of enthusiasm and interest, and it is not surprising that the nett result is loss of time, temper and money to the operator, together with the loss of a child's confidence and co-operation.

The adverse factors which seem to make the treatment of children a liability rather than an asset are very real and tangible, viz., the problem of child management, the difficulty of technical procedures, the lack of remuneration and, last but not least, the lack of appreciation of the value of the deciduous dentition.

These disadvantages can be overcome and are being overcome by men who feel that children are an asset in any practice, that the work is remunerative and not "charity" and that the wide field of preventive dentistry has its foundation in early examination and treatment. The deciduous dentition or primary dentition should more appropriately be named the "foundation" dentition.

After defining the objectives in children's dentistry, and formulating a comprehensive programme of treatment, this paper will deal with some practical aspects of the treatment of children in general practice and an outline of the procedure which I have adopted for the first and second dental appointments.

OBJECTIVES IN CHILDREN'S DENTISTRY.

1. Preservation and retention of deciduous teeth until normal exfoliation.
2. Elimination of all foci of infection.
3. Careful study of growth and development pattern with a view to the prevention of malocclusion and correction of any deviation from normal.
4. Prevention of dental caries.
5. Conditioning child to be a good dental patient.

The translation of these objectives into concrete and practical procedures results in a dental treatment programme as set out below, and treatment planned on this basis will provide the highest standard of service for our child patients.

*Read at the Twelfth Australian Dental Congress, Sydney, August, 1950.

DENTAL TREATMENT PROGRAMME.

(Modified from the list of Minimum Standards of Dental Service for Children, laid down by the American Society of Dentistry for Children.)

Three to six years.

(a) *Examination and prophylaxis.*

1. Examination and prophylaxis at intervals depending on patient's need or susceptibility.
2. Posterior bite-wing radiographs at least once per year.
3. Other radiographs as needed to study development, detect anomalies or diagnose root-end conditions.

(b) *Restoration of carious teeth.*

1. Silver amalgam (posterior teeth).
2. Silver alloy or low cast-metal casting for posterior teeth that cannot be adequately restored by plastic filling materials.
3. Silver amalgam or silicate cement (anterior teeth).
4. Discing and application of $AgNO_3$ (anterior teeth with weakened incisal angles or Class IV cavities).

(c) *Pulp treatments.*

1. Pulp-capping.
2. Pulpotomy for vital exposed pulps.

(d) *Extractions.*

1. Infected teeth.
2. Supernumerary teeth.
3. Impacted teeth.

(e) *Treatment of mouth infections.*

(f) *Surgery.*

1. Any surgical procedure necessary for health of child.

(g) *Pedodontic appliances.*

1. Appliances to maintain space and prevent malocclusion when indicated.

(h) *Prevention of dental caries.*

1. Prophylaxis.
2. Sodium fluoride therapy.
3. $AgNO_3$ immunization.
4. Diet control.
5. Oral hygiene habits.
6. Ammonium ion dentifrice.

(i) *Conditioning child to be a good dental patient.*

1. Parent education.
2. Patient education and child management.

In the 7-12 age group, additional treatment required would be:—

1. Gold castings with silicate window for fractured permanent incisors.
2. Gold castings for hypoplastic permanent posterior teeth.
3. Complete pulpectomy and root canal therapy for permanent anterior teeth.
4. Root resection of infected permanent anterior teeth.

Management of Children.

The problem of child management and control is one of the main reasons why dental treatment of the standard indicated is not attempted by many dentists.

(1) *Attitude of patient.*

There is far too much talk about the problem children, with their temper tantrums, stubbornness, bashfulness and fearfulness, and one is apt to forget that such children are in a minority.

Most normal children can be conditioned to become co-operative and helpful, especially if brought to the dental office for regular inspection from the age of 3-4 years onwards.

In my practice less than 20% of the children present any behaviour problem and the remainder give less trouble than most adults simply because a few fundamental principles are observed. Thus, for the normal child his behaviour and attitude is governed largely by the attitude of the operator.

(2) *Attitude of operator.*

The following suggestions are familiar to everyone, yet they will bear repetition for all that:

a. Most children respond to a frank, friendly and courteous greeting. Ascertain their name in advance, and use it naturally during the appointment. Do not resort to endearing terms, as children resent undue familiarity on short acquaintance.

b. Do not rush the child. A minute or two spent in establishing contact with the child will pay dividends.

c. Acquaint child with instruments about to be used to remove fear of the unknown.

d. Banish indecision and uncertainty. A firm and assured manner begets confidence.

e. Instil obedience early.

Of interest is a survey carried out by Dr. J. D. Bell on the behaviour of dentists during the treatment of children[1].

Ninety-three children and thirty-seven dentists were involved and it was found that each dentist averaged one hundred and twelve remarks or suggestions to the patient in each treatment of twenty minutes' duration.

The following resulted in accord between patient and operator:

1. Acquainting the patients with the instruments.
2. Request for co-operation.
3. Directions for help from the child.
4. Assurances that the treatment will be short.
5. Suggestions for a signal from the child when in pain.
6. Praise and approval.
7. The desirability of the treatment.
8. The desire of the dentist not to hurt.
9. Sympathy when hurt.
10. The lure of pleasures to come on completion of the treatment, such as going home, playing, eating meals.

1. Bell, J. D.—Manual of Child Psychology, New York, John Wiley, 1946, p. 761.

11. Jest and talking of irrelevant things by way of distraction.

Examples of responses which antagonised the child included:

1. Coaxing.
2. Bargaining.
3. Appealing to the child's desire to please the adult.
4. Short-cuts, such as vague answers to the patient's queries, in order to proceed more rapidly with the treatment.
5. False promises and trickery in order to try and make the child co-operate.
6. Denials of pain, warnings, threats and refusal of child's requests without reason.
7. Suggestions that the child is afraid.
8. Facetious remarks at the patient's expense in an endeavour to shame him into submission.
9. Derogatory remarks about his appearance when crying.

A. E. Seyler quotes a list of what children like and dislike about their dentist, compiled by E. J. McSwain, of N.U.[2]

"Children like: comic books in waiting-room; story-telling by the dentist; kindness and understanding; gifts or souvenirs; clean and neat offices; the clean feeling induced by the air and water in their mouths; the buzzing of instruments; a pretty assistant; and the chance to watch the dentist work by means of a mirror.

"Children do not like: pain from drills and other instruments; uncleanliness in the dentist; body odour or bad breath; untruthfulness about the pain to be expected; waiting-rooms where all chairs are large and all magazines for the grown-ups; long waiting; questions asked when the child's mouth is full; medicinal odour; Saturday appointments."

(3) *Attitude of parent.*

With most problem children the basic cause of their behaviour can be found in the attitude of one or both the parents. It may be the attitude of the parent towards the child, or simply the attitude of the parent towards dentists and dental treatment.

A rapid summing up of the parent on the first visit may indicate that parental education should be attempted before trying to make the child a good dental patient.

From a practical point of view, authorities are unanimous in saying that the parent should be asked tactfully but firmly to remain in the waiting-room during dental treatment.

I do not adhere rigidly to this rule on the first visit when a child is well-behaved but very apprehensive and fearful. In this case the parent should be kept in the background in an unobtrusive position behind the chair and out of the child's direct vision.

Premedication, Local and General Anaesthesia.

Premedication is one of the most valuable aids at our disposal in the treatment of children. It enhances and reinforces the appropriate ypschological treatment when minor behaviour problems exist, and is indispensable when

2. Seyler, A. E.—Operative technique and office procedure for care of child patient: Year Book of Dent., Chicago, Year Book Publishers, 1949, pp. 245-246.

dealing with highly strung and nervous children who remain apprehensive, tearful and unco-operative despite all the efforts of the operator.

Routine medication is not indicated, but far too many dentists fail to utilize its benefits when confronted with a behaviour problem.

The drug we use should take effect quickly, produce relaxation and a partial amnesia, remove fear and apprehension, be non-toxic and rapidly eliminated and produce no untoward effects.

Several drugs of the barbiturate group offer the abovementioned advantages, e.g., Seconal, Nembutal and Sodium Amytal.

With children, the varying factors of age, body, weight, metabolic rate and nervous tension all influence the effect of the drug, and the estimation of an adequate dosage is the main difficulty.

The use of Nembutal elixir (a proprietary line) or a syrup made by mixing the powder from a capsule in a simple unfermentable syrup enables the dentist to administer graduated dosages more easily than when 1 grain or 1½ grains capsules are used.

Any average dose for a 4- to 5-year-old child would be three-quarters of a grain of Nembutal elixir administered 45 minutes before the appointment. If this is insufficient, the dose may be increased or, alternatively, the child can be given three-quarters of a grain of Nembutal or Seconal before retiring on the night prior to the appointment, in addition to the normal dosage.

The effective dosage should be marked on the patient's record card.

Whenever a sedative is employed, the child must be accompanied by a parent or escort, as the effects may last much longer than anticipated. The provision of quiet surroundings and subdued light will aid in the effective action of the drug.

Sedation[3] should be used to:—

1. Reduce physical resistance.
2. Reduce psychic shock.
3. Counteract the effect of the vasoconstrictor used in local anaesthetic solution.
4. Increase effectiveness of procaine.
5. Minimise procaine toxicity.

Local Anaesthesia.

With modern technique and anaesthetic solutions, the value of local anaesthesia in carrying out operative procedures on adult patients is universally recognised but many operators refrain from utilizing these techniques on children, because of the psychological effect of injections and the fear of upsetting the child patient.

However, the advantages of local anaesthesia completely outweigh the few minor disadvantages. When used judiciously, pain can be almost entirely eliminated from all routine treatment, resulting in a saving of time and nervous energy for the operator, and a co-operative and grateful child patient. Local anaesthesia will remove one of the basic causes of fear—pain; though an unnecessary injection or one which hurts may cause more trouble than it is worth. By the same token it is poor policy to wait till cavity preparation becomes painful before resorting to an injection.

3. Sweet, C. A.—Lippincott's "Handbook of Dental Practice," Philadelphia, Lippincott Publ. Co., 1947, p. 307.

Each operator has his own preferences for the type of syringe, needle, and anaesthetic solution.

In the busy practice the carpule type metal syringe has the advantages of speed and convenience, though some operators prefer an all-glass syringe (Luer-lok) especially for conduction anaesthesia. The latter is lighter to handle and may have a less frightening effect, and allows a more delicate touch when held in a pen grasp.

For my purposes, the carpule type syringe with 1" or $\frac{7}{8}$" needles (g. 25-27) for mandibular blocks and posterior-superior-alveolar injections and an all-metal Raison syringe with 1" needle and long adaptor, leaving 4 mm. of needle exposed for infiltration and intra-osseous injections, have proved very satisfactory.

The pain of injection can be reduced to a minimum by using a sharp needle, injecting slowly, and in winter having the solution warm.

The use of a topical anaesthetic at the site of injection is often recommended—Butyn, Amethocaine, Scuroform, 2% Iodine and 10% Ethyl Aminobenzoate in propylene glycol, and Ethyl Chloride on a pledget of cotton wool are some of the drugs advocated.

The most effective technique is as follows[4]: Isolate and dry the tissue and apply with a small burnisher or by a glass applicator held firmly to the tissue. Firm pressure creates a depression in the tissue which affords a convenient place for needle insertion.

My own experience has been that topical anaesthesia is time-consuming and creates suspense in the patient.

All preparations should be made beforehand so that the injection technique is swift, unhurried and done in a matter-of-fact way. Press a finger firmly over the site of injection (previously dried and swabbed with Metaphen) and say, "Now, John, I am going to put this tooth to sleep, right here," simultaneously taking syringe from nurse, removing cotton roll from the needle and commencing the injection.

General Anaesthesia.

General anaesthesia has a place in private practice not only for removal of an abscessed tooth, or multiple extractions, but for operative work when a patient cannot or will not co-operate, e.g.:—

1. a spoiled child or very young child;
2. a mentally defective child;
3. a child with motor disability of spastic type;
4. a young child who, though co-operative, has six or eight large interproximal cavities.

There are many obvious disadvantages in doing operative work under general anaesthesia, which will deter all but the most enthusiastic, but in certain cases this is the only possible way of carrying out adequate dental treatment. The use of a general anaesthesia will eliminate the series of four to eight appointments which will tax severely the patience and co-operation of a young child and perhaps make him less amenable to future treatment.

The selection of an anaesthetic and technique of administration are beyond the scope of this paper.

4. McBride, W. C.—Juvenile Dentistry, Philadelphia, Lea and Febiger, 1945, pp. 236-7.

Trilene and Vinesthene have a particular application for use on children when a short anaesthetic is required for the extraction of one or two abscessed teeth.

DIAGNOSIS AND TREATMENT PLAN—OUTLINE OF ROUTINE OFFICE PROCEDURE.

First appointment.

a. Preliminary examination.

b. Application of disclosing solution.

c. Prophylaxis.

d. Radiographs.

e. History of patient.

In greater detail, the procedure is as follows:—

a. The parent is allowed to enter the surgery with the child for the initial part of this appointment, but if any behaviour problem arises then the parent is requested to leave. Forty per cent. of behaviour problems may be overcome by excluding the parent from the operating room.

There is some psychological advantage in being seated on a stool ready to greet the child by name.

Examination should begin with a detailed visual inspection of the entire mouth, with special thought for supernumerary or missing teeth and occlusal relationship. In addition to cavities present, all pertinent information should be recorded on patient's chart.

b. Application of a disclosing solution makes the task of prophylaxis easier and both parent and child are impressed by this visual proof of the need for prophylaxis and regular brushing.

Mercurochrome (2%) stains all plaques very effectively and the addition of a pleasing medicament (e.g., aniseed) is suggested. Areas not receiving adequate brushing should be recorded on chart.

At the conclusion of treatment, a second application of disclosing solution will clearly reveal the efficacy of toothbrushing and any corrections can be made.

c. A prophylaxis is a pleasing introduction to dental treatment. Rubber cups are preferable to bristle brushes and the polishing paste should be flavoured.

The prescription which I use is:—

Pumice	170 gr.
Borax	30 gr.
Glycerine	75 gr.
Carmine	0.75 gr.
Spearmint	1 drop.

d. When the child is four years old or younger, take bite-wing films of posterior teeth annually.

At the age of five, a full mouth radiographic examination (8 films) is desirable, to determine presence or absence of permanent teeth and any other abnormality.

Bite-wing radiographs are indispensable in locating early proximal cavities[5]. Early treatment means that the headaches in children's work, painful cavity preparation, pulp exposures, sensitive hypertrophied tissue which has grown into cavities, and restorations inserted over sick pulps are reduced to a minimum.

Often parents are unwilling to pay a fee for Xrays of "milk teeth" but, if the operator is convinced of their value, he will be able to impart that conviction to the ninety per cent. who will co-operate in every way if approached in the right manner.

e. A complete case history is valuable in diagnosis and treatment-planing, and the following information should be recorded:—

Birthday, physical and chronological age, pre-natal history, any early disorders or nutrition problems (breast- or bottle-fed), family dental history, and any previous visits to the dentist.

Length of appointment—30 minutes; fee for prophylaxis.

Second appointment.

a. Charting and treatment plan completed with aid of radiographs.

b. Parent shown radiographs—discussion of treatment plan, revised if necessary; estimate of cost.

c. Simple restoration, discing of anteriors, first application of NaF or control of rampant caries.

d. Toothbrush instruction:—

1. Demonstration on model.

2. Demonstration on child (child holds hand mirror).

3. Child brushes own teeth.

Length of appointment—30-45 minutes; fee for radiographs and any treatment given.

Treatment Plan and its Importance.

From the data obtained at the first appointment we know:—

a. The attitude of child, temperament, influence of parent, and desirability of premedication. If the child is spoilt and unruly, then the parent can be warned at the outset that the time factor may influence the cost.

5. Trithart, A. H. & Donnelly, C. J.—A comparative study of proximal cavities found by clinical and roentgenographic examination: J.A.D.A., 40:33-37, 1950.

b. The number and extent of cavities: simple Class I, Class III or Class V cavities in deciduous molars are usually less sensitive than Class I cavities in permanent molars.

c. The questionable teeth: extraction or pulpotomy depending on:—

1. Number of teeth with pulp-involvement.
2. Number of teeth missing.
3. Vitality of pulp and extent of exposure.
4. Health of child.
5. Attitude and co-operation.

d. Teeth to be extracted, and need for space maintenance.

1. The loss of second deciduous molars is more serious than the loss of first molars.
2. The loss of deciduous molars is more serious in a five-year-old than in an eight-year-old.
3. When a Class II malocclusion exists, space maintenance is vital in the mandible and, in a Class III malocclusion, it is equally vital in the maxilla.

The problem of space maintenance is simplified if the following procedure is adopted:—

Where teeth have been lost prematurely, bend a U-shaped wire staple to fit the space, and check for closure of space at monthly intervals.

This task can be entrusted to an intelligent parent (suggest a fortnightly check) and if an appliance is needed, you won't have to sell the idea.

e. Oral hygiene. If the oral hygiene is poor, then restorative work and patient and parent education must go hand in hand. Prophylactic odontotomy is desirable under these circumstances.

f. Caries activity and control. The need for diet charts or a programme of caries control should be assessed before treatment plan is completed.

A little more thought given to planning the treatment which our young patients require will pay handsome dividends in every respect and avoid many of the headaches associated with children's dentistry.

The DENTAL JOURNAL of AUSTRALIA

EDITORIAL DEPARTMENT

FLUORIDATION OF PUBLIC WATER SUPPLIES

More than ten years ago the theory was advanced that the addition of fluorine to communal drinking water might reduce the incidence of dental decay. This suggestion followed on the classical work of H. T. Dean and his predecessors regarding endemic fluorosis and dental caries. Some five years later a number of large-scale experiments were commenced in U.S.A. in order to test the validity of this suggestion.

Since that time much has been written, both in scientific journals and in the popular press, concerning the efficacy of artificially fluoridated waters in assisting in reducing the incidence of dental caries. It has been possibly the first occasion on which any great hope has been offered to the public of some practical measure to assist in the reduction of dental disease. The public, as a result, has not been slow to respond to this possible opportunity and throughout America surveys have been carried out with full public support.

In Australia the public has demonstrated its interest also, by continual references to this prophylactic measure in the newspapers and by the never ceasing series of questions which come to the members of the profession from their patients on this subject. In addition, many lay public bodies such as shire councils have made numerous enquiries with a view to implementing some scheme similar to those initiated in U.S.A.

It is a very necessary thing that in such schemes carefully controlled studies must be carried out over a long period and then adequately evaluated before a final answer is given. In this regard it was recently reported from the Newburgh-Kingston study in America that within three years the D.M.F. rate had dropped from 21 to 14.8 per hundred permanent teeth. It has also been reported that the general health of the population in whose drinking water fluorine had been placed has in no way been affected.

Before such schemes can be carried out, it is necessary to have, firstly, complete co-ordination between the governing bodies. This has been achieved quite readily in the United States of America where the American Water Works Association, the State and Territorial Dental Health Directors and the Assistant Surgeon-General of the United States Public Health Service

have all issued statements indicating their willingness to co-operate in fluoridation programmes.

It is very distressing, therefore, to find that in Australia the path is not being cleared so rapidly. A senior member of the Public Health Service in New South Wales was recently quoted as saying that he thought that the addition of chemical fluorines to municipal water supplies to lessen dental decay must be strictly watched, as the discolouration of teeth which could follow the use of the wrong proportions might involve the councils in claims for damages.

We can only hope that the official was misquoted, for otherwise he shows a lamentable outlook on a subject which has been a matter of public health interest for some ten years.

At the same time it would be extremely unwise to give *carte-blanche* to all those desiring to indulge in fluoridation schemes, for uncontrolled experiments lead only to confusion and inability ever to check the true efficacy of such a procedure.

It is understood that the fluoridation of public water supplies is receiving consideration by public health authorities, but it is also known that numerous councils are preparing to commence their own fluoridation plans. It is to be hoped that the health authorities move with sufficient rapidity to decide upon an integrated and controlled plan in Australia before confusion reigns, due to individual attempts to put such a plan into action.

News and Notes

E. F. HEWLETT ACCEPTS POSITION OF ASSOCIATION SECRETARY

It was announced at the Annual General Meeting that Mr. Edward Frederick Hewlett, B.D.S., had been appointed to succeed Mr. Robert Harris as Secretary of the Australian Dental Association, New South Wales Branch.

Mr. Hewlett entered the Faculty of Dentistry at the University of Sydney in 1932, holding a Public Exhibition. He graduated in 1935 but did not receive his degree of Bachelor of Dental Surgery until he attained the age of 21 years during 1936. Upon graduation, he was appointed to the staff of the United Dental Hospital of Sydney as Clinical Assistant and later undertook the duties of Pathologist and Bacteriologist at that hospital.

Mr. Hewlett practised in Broken Hill for some twelve years, during which time he held the position of Honorary Dental Surgeon to the Broken Hill and Districts Hospital and also undertook the duty of supervising the designing and establishment of the large Broken Hill Mines Dental Clinic. During the

War he served as Flight-Lieutenant in the R.A.A.F. and was for some time in charge of the No. 2 Mobile Dental Unit.

Mr. Hewlett happily combines his professional ability with a keen sense of humour, marked business acumen and an excellent gift for organisation. Despite the high standards that have been set by his predecessor, Mr. Harris, the Executive Committee feel assured that a very worthy successor will carry on the duties of Secretary of the Association.

HONORARY DENTIST

Applications are invited for the position of Honorary Dentist (female) at the Rachel Forster Hospital for Women and Children, Pitt Street, Redfern. Honorarium £3/3/- per session, maximum of two (2) sessions per week.

Applications together with copies of testimonials to be in the hands of the undersigned not later than Wednesday, 31st January, 1951.

MARY C. PUCKEY,
Chief Executive Officer and
Medical Superintendent.

Association Activities

AUSTRALIAN DENTAL ASSOCIATION FEDERAL NEWSLETTER

This Newsletter is issued following the holding of the Meeting of the Federal Officers in Sydney on 21st October, 1950.

The Federal Officers decided at their first meeting to issue a periodical newsletter which would amplify the information contained in the Minutes of Meetings of the Federal Executive.

Such newsletters can help to give the members of State Branch Councils or Committees a much clearer picture of activities in the Federal sphere and can help to create a much closer relationship between State Branches and Federal Officers.

This is only an experiment and after a few issues we will ask you to comment upon its value.

It may be a successful method of meeting the criticism that members in the past have not always been given sufficient information.

1. Repatriation Dental Treatment.

At the Annual Meeting certain questions were raised concerning the administration and control of dental treatment as provided by the Repatriation Commission. Careful consideration of the various aspects of this problem was made by the Officers and, in order to correlate the information and prepare appropriate data for further action, a letter has been sent to all State Branches seeking detailed information on the problems current in each particular State.

2. Membership F.D.I.

Action has been taken to determine the possibilities of membership of the F.D.I. by the Australian Dental Association. Members of Constituent Bodies should fully appreciate the importance of international support and influence which would be forthcoming from alliance with the Federation Dentaire Internationale. The necessity for this support may be greater than anticipated should a solution of the various social problems now confronting the profession in many countries be attempted along lines detrimental to the profession.

3. Pharmaceutical Benefits Act.

The Federal Officers would point out that benefits cannot be obtained until the Pharmaceutical Benefits Act has been amended.

The Federal Officers strongly support the resolution made at the Annual Meeting, and their attitude has been strengthened by the many requests recently reecived that measures be taken to afford relief for dental treatment.

A letter has been directed to the Minister for Health setting out the problems involved and stressing the necessity for steps being taken to amend the Act in order that some benefits may be given to patients requiring urgent treatment in certain cases, and asking for removal of the present embarrassing situation in which the members of the dental profession find themselves.

4. Alien dentists.

Correspondence from the South Australian, Victorian and Queensland Branches relative to the problem of alien dentists was considered and also a lengthy communication from the Minister for Immigration, as a result of which it has been decided that an interview should be held with representatives of the Department to present the Association's views on the matters raised.

5. Honours and Awards.

The Honorary Officers had to consider correspondence from various Branches relative to the resolution made at the Annual Meeting concerning the recommendation for honours and awards and, in view of the lack of unanimity of the views expressed in these letters, it was decided that legal advice should be obtained as to the constitutional position in this matter before any action be taken.

6. Equipment and Supplies Sub-Committee.

In view of Dr. Wilkinson's retirement as President of the Association, Dr. J. V. Hall Best will now represent the Association on the Equipment and Supplies Sub-Committee of the Central Medical Co-ordination Committee.

7. Administrative Charges.

Correspondence was read from the New South Wales Branch indicating a most generous arrangement for the services involved in the administration of the Federal Office. Despite the increased costs of services on all sides, the New South Wales Branch had made the offer for a three months' trial period and the Federal Officers were pleased to accept this most generous gesture.

At the end of this period it would be possible to determine whether the arrangement could be continued.

Assistance from New South Wales in this regard was greatly appreciated, in view of the fact that the National Dental Survey Fund had been completely exhausted and that, therefore, there would be no possible allocation from that source towards the cost of the Federal Office expenses.

8. Affiliation with the British Dental Association.

Following receipt of advice from the Victorian Branch, through discussions held by Professor Amies whilst he was in England, the various Branches are notified that affiliation with the British Dental Association can be arranged by members of the Australian Dental Association by application through their respective State Branches. The cost of such affiliation would be £1/11/6 per annum (sterling) which includes the British Dental Journal.

9. Importation of Dental Materials.

In view of the difficulties of importation of certain dental materials and the desire to have the Standards Committee of the Association regarded as the referee body in such matters, a letter has been directed to the Standards Committee requesting it to obtain from its panel of co-operating practitioners a list of the more essential overseas products which are at present unavailable in Australia. Immediately on receipt of this data an approach would be made to the Customs Department.

10. Alteration to the Constitution.

A draft of the proposed Constitution, as revised by Mr. Heathfield, solicitor, of Melbourne, was before the Officers for consideration and arrangements are now in hand for Dr. Wark to consult with Mr. Heathfield and prepare the final draft for presentation to the Officers and private circulation to the State Branches. When this has been done, the Constitution in its final form will be circulated to the State Branches for confirmation and amendments, if any, will be submitted to a special meeting of the Association to be convened at an appropriate time.

Yours faithfully,

J. V. HALL BEST,
President.

EXECUTIVE MEETING
NEW SOUTH WALES BRANCH

Extract from the Minutes of the meeting of the Executive Committee held in the Council Room, B.M.A. House, 135-137 Macquarie Street, Sydney, on Monday, 11th December, 1950, at 7.30 p.m.

Present: Dr. E. R. Magnus, President, in the Chair; Dr. A. G. H. Lawes, Vice-President; Dr. F. E. Helmore, Vice-President; Mr. F. R. Reid, Honorary Treasurer; Mr. N. E. Edney, Dr. E. H. Bastian, Mr. H. M. Finnie, Mr. W. A. Grainger, Mr. R. Krauss, Mr. R. G. Leeder, Mr. R. Y. Norton, Mr. H. R. Sullivan, Mr. R. Tompson, Mr. R. W. Wilson, Mr. A. G. Hunter, Mr. E. J. Gee; Mr. M. J. Griffin, Blue Mountains Division; Mr. C. D. Reynolds, Newcastle and Hunter River Division; Dr. A. G. Rowell, Western Division; Dr. J. D. Oddy, South Coast Division.

Apologies: Mr. A. R. Wooler, North and North West Division; Mr. H. W. Warner Shand, Far North Division.

In attendance: Mr. Robert Harris, Secretary; Mr. E. F. Hewlett, Secretary elect.

Business Arising from Minutes:

Annual General Meeting: The President stated that the Association's Auditors, Messrs. Beck and Wayland, had requested that the date of the Annual General Meeting be altered. It was resolved that, if after consultation with the Association's Auditors, Messrs. Beck and Wayland, it was considered advisable, then the closing date of the Association's financial year be changed to 31st August.

Benevolent and Provident Fund (Appointment books): The President stated that this matter would be discussed by the Benevolent and Provident Fund Committee.

Divisional Representatives as additional members of the Executive Committee: Following receipt of letters from the North Eastern and Southern Divisions, it was resolved that Mr. H. S. Neal be appointed Divisional Representative for the North Eastern Division and Mr. G. M. Cox for the Southern Division.

A letter was also received from the Southern Tablelands Division confirming the intention of that Division that Mr. L. Cooper should be its representative on the Executive Committee.

Appointment of Committees for the ensuing year:

It was resolved that the Honorary Officers be members *ex officio of* all Committees. It was further resolved that Mr. N. E. Edney be a member of the Committee of Honorary Officers.

The elections to Committees resulted as follows:—

Committee of the Honorary Officers: Dr. E. R. Magnus, President; Dr. A. G. H. Lawes, Vice-President; Dr. F. E. Helmore, Vice-President; Mr. F. R. Reid, Honorary Treasurer; Mr. N. E. Edney, Past President.

Journal Committee: Mr. A. G. Hunter, Chairman; Mr. Ralph Tompson, Mr. H. R. Sullivan, Mr. R. Y. Norton, Mr. J. G. Fletcher, Mr. E. J. Gee, Mr. G. E. Baulman.

Research Committee: Mr. H. R. Sullivan, Chairman; Dr. R. M. Kirkpatrick, Mr. R. L. Gabriel, Dr. J. S. Baird, Professor A. J. Arnott.

Dental Health Education Committee: Mr. Ralph Tompson, Chairman; Mr. G. Morse Withycombe, Dr. A. Thornton Taylor, Mr. N. D. Martin, Mr. J. W. Skinner, Dr. Basil-Jones, Dr. L. G. Crane, Mr. T. Royse-Smith, Mr. R. Y. Norton, Dr. R. N. McMullin.

Illegal Practice Investigation Committee: Mr. H. M. Finnie, Chairman; Mr. R. Krauss, Mr. R. W. Wilson, Mr. R. G. Leeder, Dr. A. G. Rowell.

Membership Committee: Dr. F. E. Helmore, Chairman; Mr. H. M. Finnie, Mr. R. Y. Norton, Mr. H. R. Sullivan.

Syllabus Committee: Mr. W. A. Grainger, Chairman; Mr. E. J. Gee, Mr. J. W. Skinner.

Divisions Committee: Mr. R. Krauss, Chairman; Mr. N. E. Edney, Mr. H. M. Finnie, Dr. A. G. Rowell, Mr. R. G. Leeder.

Sports and Social Committee: Mr. R. Y. Norton, Chairman; Mr. F. R. Reid, Mr. W. L. Mitchell, Mr. T. Royse-Smith, Mr. K. O. Binns, Mr. R. G. Leeder, Mr. R. W. Wilson.

Benevolent and Provident Fund Committee: Mr. F. R. Reid, Chairman; Dr. J. D. Oddy, Mr. R. Krauss, Mr. R. C. Dennett, Mr. L. J. Noone.

Library Committee: Mr. A. G. Hunter, Chairman; Dr. E. H. Bastian, Mr. Ralph Tompson, Mr. A. O. Watson, Dr. R. W. Halliday.

Post-Graduate Courses Committee: Mr. W. A. Grainger, Chairman; Mr. R. Krauss, Dr. G. V. Gengos, Dr. R. W. Halliday, Dr. A. W. Bull, Dr. R. N. McMullin.

Standards Committee (Liaison Officer): Following the resignation of the Secretary, Mr. R. Harris, it was necessary to fill this vacancy, and it was resolved that Mr. Ashley G. Hunter be appointed Liaison Officer of the Standards Committee for the ensuing year.

Reports from Committees:

Committee of the Honorary Officers: In view of the necessity for the appointment of an editor for the Dental Journal, the Committee of the Honorary Officers had considered this matter and recommended that Mr. H. R. Sullivan be requested to act as Honorary Editor of the Journal for a period of three months, viz., from January to March, 1951, inclusive.

The President indicated that in the opinion of the Honorary Officers Mr. Sullivan was a suitable person to take charge of the Journal during its transitional period and he was most grateful that Mr. Sullivan would undertake this task. Mr. Sullivan having agreed to act as Honorary Editor, it was resolved that he be appointed Honorary Editor for the three months, January to March, 1951.

Congress Executive: The Secretary reported briefly on the final meeting of the Congress Executive Committee, at which the Balance Sheet audited by Messrs. Beck and Wayland had been presented. This Balance Sheet showed a surplus of £109/9/9, against which must be offset any amounts still outstanding for some unsettled accounts.

In view of the fact that neither the Secretary nor the Assistant Secretary of Congress would be available to deal with the Congress account, the Auditors had recommended that the surplus shown on the Balance Sheet, together with any outstanding monies which may come to hand by way of refunds, be transferred to the Federal Office and that a letter be sent indicating that this final figure may be subject to adjustment following the receipt of any outstanding accounts.

It was resolved that this action in finalising the Congress account, as recommended by the Auditors, be approved and that the Secretary's action in writing to the Federal Office on the above lines be endorsed.

Membership:

Deceased: The Secretary reported the death of Mr. W. F. Ormiston, of Cowra, and that a letter had been sent to the deceased's family.

In view of the recess period, it was necessary for authority to be given for the Defence, Syllabus and Membership Committees to operate until March, 1951.

It was resolved: (1) that during the recess period of the Executive Committee the Honorary Officers be empowered to grant membership to such applicants as they consider should be admitted during this time; (2) that the Defence Committee be empowered to act as they thought fit in such cases as came before them during the recess period of the Executive Committee; (3) that the Syllabus Committee be empowered to act during the recess period of the Executive Committee.

It was further resolved that action be taken to present a series of lectures by members of the Association to students in the Faculty of Dentistry during the third term of 1951 and that the necessary arrangements be made with Professor Arnott, Dean of the Faculty of Dentistry.

Federal Office:

The Secretary tabled a letter from the Federal Office enclosing a copy of the Minutes of the Executive Meeting held on 21st October, together with copies of the Newsletter (published on pages 45-46 of this issue).

It was the intention of the Federal Executive, unless otherwise directed, to publish in the form of a Newsletter the transactions of meetings of the Federal Executive.

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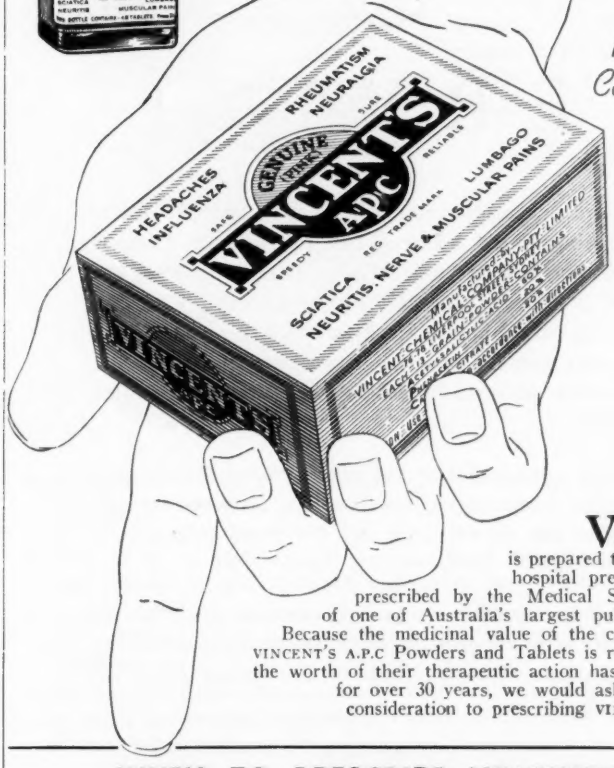

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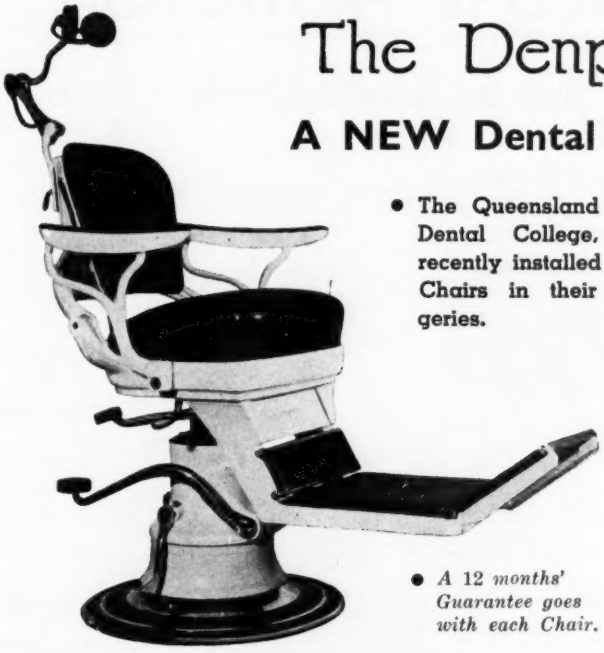

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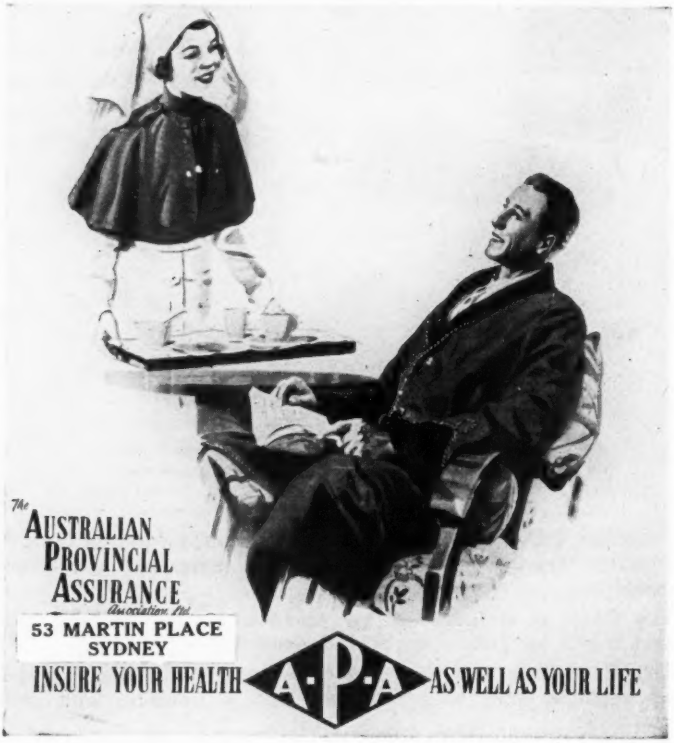
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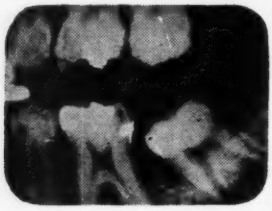
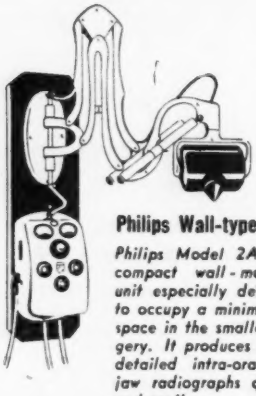

1.

2.

What would have been your diagnosis?



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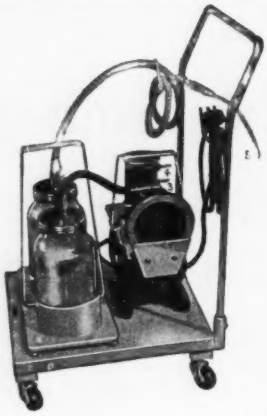

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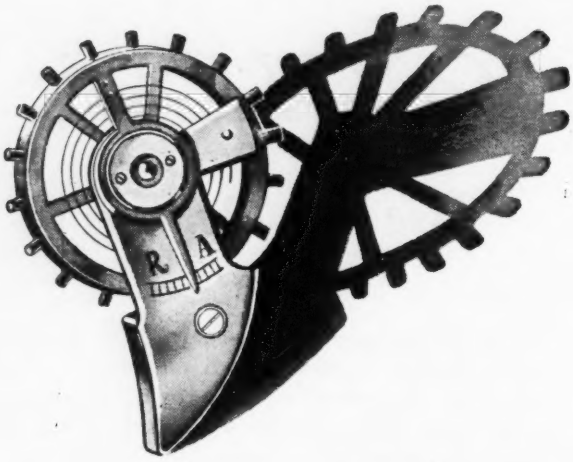

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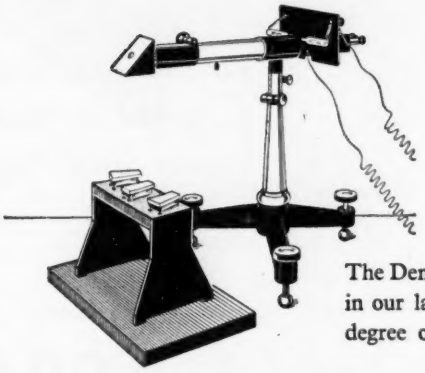

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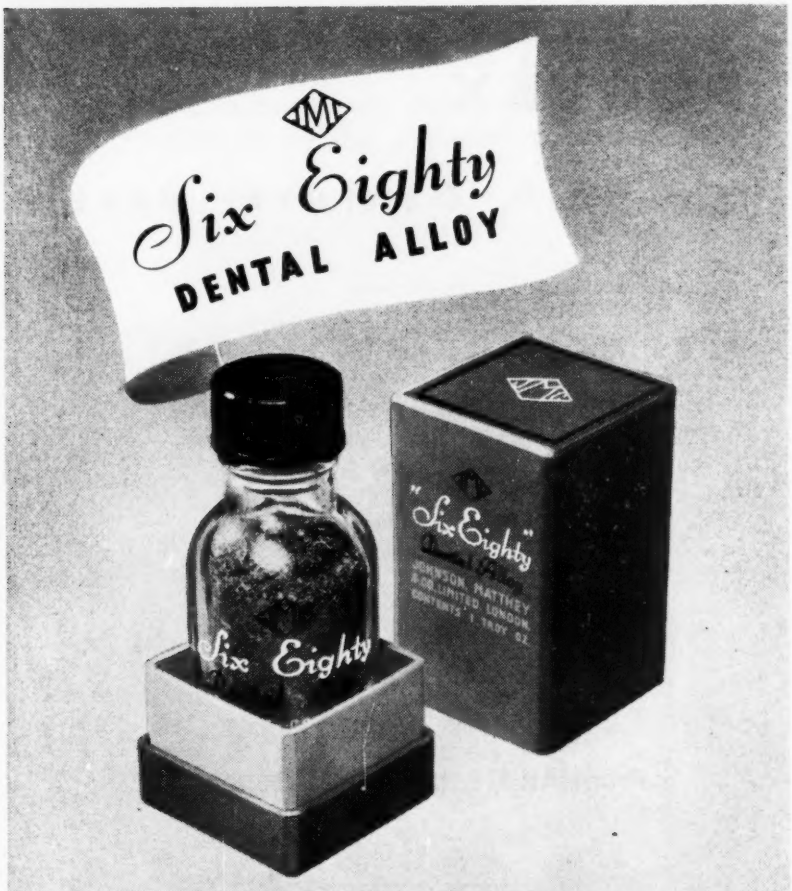

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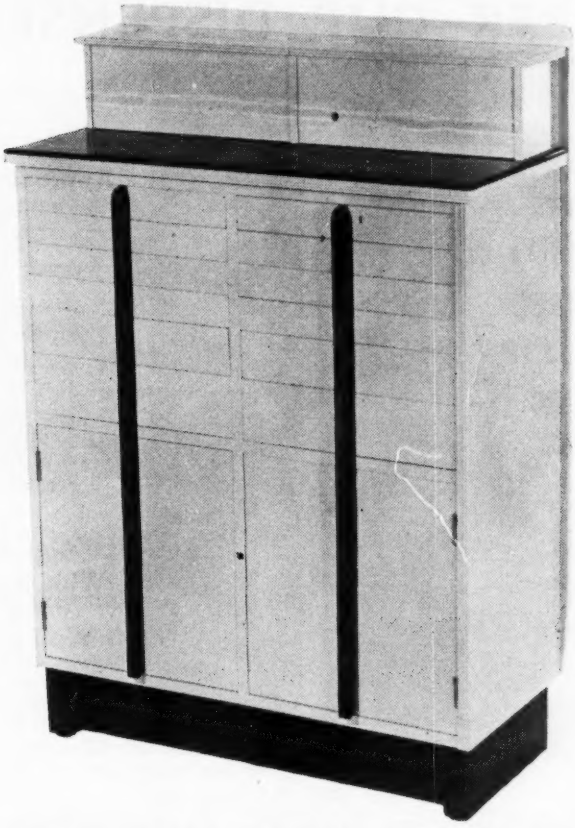

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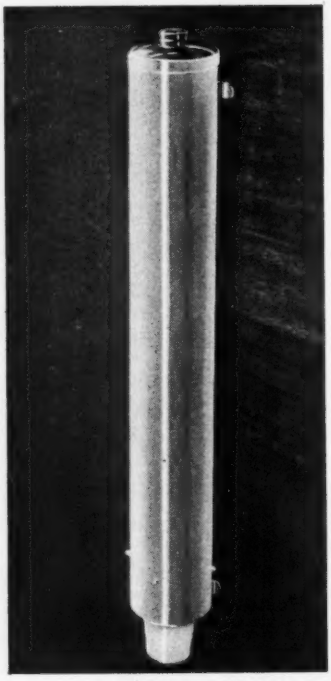

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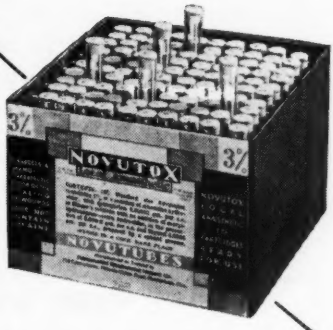

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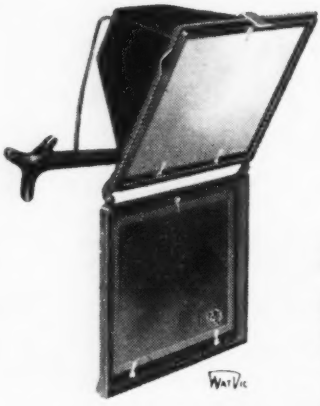

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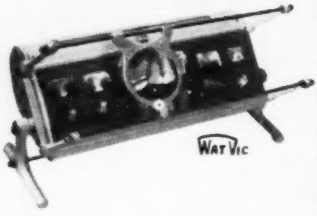

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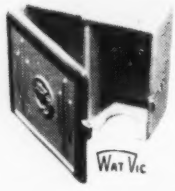

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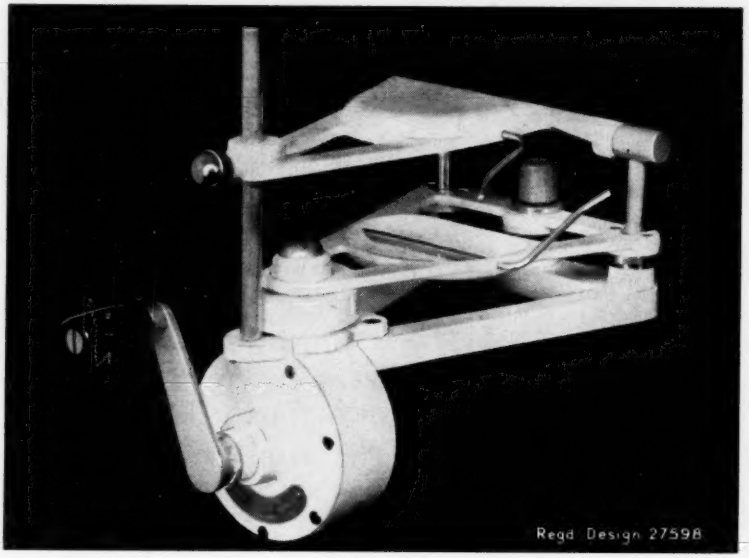

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